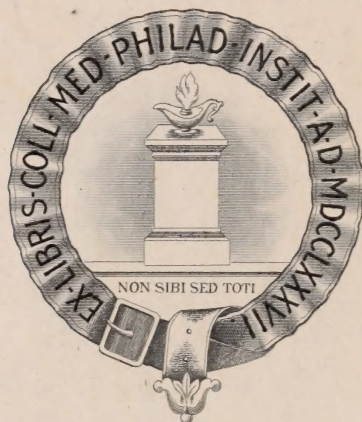




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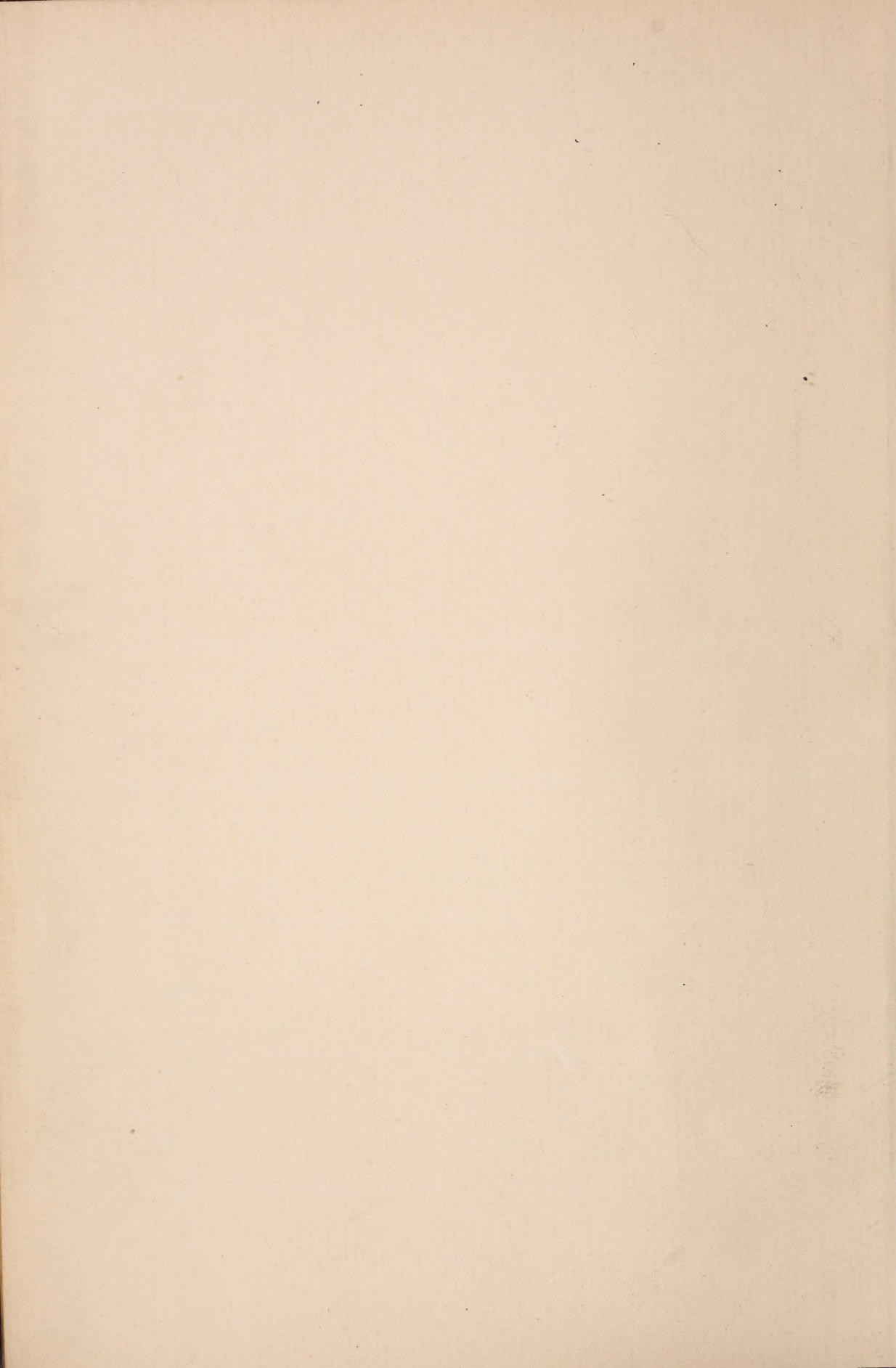


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INTERSTATE MEDICAL JOURNAL

Volume XXV—January-December, 1918

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THE MODERN HOSPITAL PUBLISHING CO., Inc.

BUSINESS AND EDITORIAL OFFICE,
58 East Washington Street,
Chicago.

EASTERN OFFICE,
1 Madison Avenue,
New York.

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INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

JANUARY, 1918.

No 1.

EDITORIAL.

A DIETETICS BOOK SHELF.

In the December issue of *THE MODERN HOSPITAL* Miss Rena S. Eckman writes under the heading, "Standardization of the Work and Training of the Dietitian." In the same issue there is an editorial, commenting this article, which pertinently asks, ". . . what does the average physician know about the practical carrying out of his own orders for scientific feeding?" Which, be it noted, assumes that said average physician knows how to formulate such orders.

Those who can do neither of these things are conscious of their deficiency, and even those who can more or less perfectly prescribe diet are in constant need of books dealing with the subject—both systematic works and books of reference.

It would seem, therefore, opportune to deal in a collective manner with a selection of recently published works on dietetics, submitted for review during the past year. It so happens that, either as new editions or as new works, there has appeared during that time a series of books which constitute a nearly complete working library of dietetics for the busy physician's book shelves. Of these, five, which overlap only as much as is inevitable and even desirable, have been chosen.

While Lusk on "The Science of Nutrition,"¹ of which the third edition maintains the high standard of excellence of its predecessors, is the indispensable guide to the principles on which rational dietetics is founded, it is a work which, for the average physician, needs an introducer. By no book has this last office more admirably been fulfilled, in the past, than by Sherman's "Chemistry of Food and Nutrition."² Nevertheless this work suffers under the disadvantage of being merely reprinted from the electrotypes of the first (1911) edition and bears no marks of revision. The latest dates in the otherwise excellent tables of references at the end of each chapter are prior to the year 1911. Such a progressive sub-

ject as the chemistry and physiology of food cannot be handled with fairness to the author or to his public in this stereotyped fashion.

To establish a measure of the importance of this point, I have counted, approximately, the references in Lusk dated before and after 1910. I find that, of all the articles and works reference to which is considered by Lusk necessary to the due treatment of the subject, more than fifty percent bear date subsequent to that of the publication of Sherman's book, which the house of Macmillan contents itself with issuing as a reprint. It is to be hoped that a new and revised edition will soon be published. In the meantime it remains, though obsolescent, still one of the best, if not the best, introductions to and class text-books of the subject with which it deals.

Such an elementary treatment of the subject will not suffice the modern physician—it will do little more than set him on his road. For his further guidance he will require more detailed treatises, and first of these comes Lusk. The new edition, which the author intends to be the last, may be confidently accepted as a sound exposition of the present situation of the science of nutrition. It contains, further, much that is prophetic. It is thoroughly up to date, and includes a specially interesting chapter on the nation-feeding problems of wartime. The body of the work is a masterly account of metabolism, normal and abnormal. In stating his intention not again to revise this work, Lusk offers the prophecy that, within the next decade, nutritional science will be treated from the standpoint of physical chemistry—a pregnant hint to those who would not be left behind.

Having rendered himself familiar with the present status of the science of metabolic physiology, the next need of the student is a reference handbook on the subject of foods—rather than food—and a manual of application. In other words, from metabolism he turns to foods, and from foods to feeding.

On the subject of foodstuffs, studied from the point of view of dietetics, Hutchison's work, "Food and Dietetics,"³ the fourth edition of which appeared in 1917, is encyclopedic. There is, in English, no book which can pretend to contest its primacy in its particular province. The most characteristic and most valuable part is the detailed account of the properties and composition of foodstuffs. So well-known a work needs no detailed description, and it is unlikely that anyone making up a bookshelf on dietetics would omit it from his list.

While several of the chapters in Hutchison should be read in a systematic course, the book must inevitably function chiefly as a work of reference. It is perhaps not sufficiently dogmatic for immediate guidance.

The last two volumes on our list, Graves⁴ and Strouse and Perry,⁵ owing to the singleness of viewpoint of each, supply the direct instruction and compact information which furnish at least a definite point of departure. Miss Graves, as becomes the editor of the Dietetics Section of *THE MODERN HOSPITAL*, in "Modern Dietetics"⁴ treats the subject matter chiefly from the institutional point of view and succeeds admirably in her task. Few high-class physicians nowadays have practices entirely outside hospitals, and it behooves them, therefore, to acquaint themselves with the dietetic problems of such institutions as they bear on the welfare of their patients. Dietetics and dietitians are but slowly coming into their own, and the hospitals must necessarily be the main foci from which their influence radiates into the field of general practice.

Strouse and Perry set before themselves a different objective and have undoubtedly attained it. The keynote of their work, "Food for the Sick,"⁵ is that it is rightly becoming more and more usual to take the patient, or his friends, into the physician's confidence as to the nature and treatment of his disease, and that diet is occupying an increasingly important place in therapeutics. The book is therefore written both for the physician and for the patient, and its explanations are couched in language understood by educated laymen. Nevertheless the authors have not sacrificed truth to popularity of exposition. The subject matter is treated under the heads of conditions for which dieting is needed. It is natural that the most elaborate chapter is that on Diabetes Mellitus, but it is equaled in interest and in adequacy of treatment by those on nephritis and on gastrointestinal disorders.

The student who has familiarized himself with the books which we have passed in review, in such a way that their contents are immediately available, will be in a position to deal with most of the dietetic problems which arise in the practice of clinical medicine. The subject is, however, a rapidly growing one, and we have therefore established a department of Dietetics and Diseases of Metabolism, which will be conducted by Dr. Jacob Rosenbloom, of Pittsburgh, whose writings and researches on these subjects are familiar to our readers, and whose immense erudition fits him peculiarly for the task of keeping that department abreast of progress.

REFERENCES.

¹ *THE ELEMENTS OF THE SCIENCE OF NUTRITION*. By Graham Lusk, Ph. D., Sc. D., F. R. S. (Edin.), Professor of Physiology at the Cornell University Medical College, New York City. Third edition, reset. Philadelphia: W. B. Saunders Company. 1917. Price, \$4.50.

² *CHEMISTRY OF FOOD AND NUTRITION*. By Henry C. Sherman, Ph. D., Professor in Columbia University, New York. The Macmillan Company. 1917. Price, \$1.50.

³ *FOOD AND THE PRINCIPLES OF DIETETICS*. By Robert Hutchison, M. D. (Edin.), F. R. C. P., Physician to the London Hospital; Physician in Charge of Out-patients to the London Hospital for Sick Children. With plates and diagrams. Fourth edition. New York: William Wood and Company. Price, \$4.

⁴ MODERN DIETETICS—FEEDING THE SICK IN HOSPITAL AND HOME, WITH SOME STUDIES ON FEEDING WELL PEOPLE. By Lulu Graves, Dietitian to Lakeside Hospital, Cleveland. St. Louis: The Modern Hospital Publishing Company. 1917. Price, \$2.

⁵ FOOD FOR THE SICK. By Solomon Strouse, M. D., Associate Attending Physician at the Michael Reese Hospital; Professor of Medicine at the Post-Graduate Medical School, Chicago, and Maude A. Perry, A. B., Dietitian at the Michael Reese Hospital, Chicago. Philadelphia and London: W. B. Saunders Company. 1917. Price, cloth, \$1.50.

REVOLUTIONARIES.

In an editorial intended for the INTERSTATE issue of March last I had written the following passage: "All honor should be paid to revolutionaries who, always at the risk, and frequently with the loss, of their own lives, secure liberties for others. But God help the country that is governed by revolutionaries, however sincere." While this article was in the press the Russian Revolution occurred, and, undesirous of seeing the INTERSTATE in the rôle of a Cassandra, I eliminated the passage quoted. Intimate experience of revolutions and some study of political history had, however, not failed to inspire me with misgivings as to the fate of the movement in the great Slav empire.

It is natural that the same type of man who can conceive and execute a plan of revolution should not be adapted to the task of governing. It is inevitable that they who carry out revolutions under such conditions as those which prevailed in Russia cannot have received a training in the art of government; for governing requires an apprenticeship as arduous as that of any other calling. You cannot step from the desk of a telegraph clerk to the arm-chair of a prime minister, as has happened in Turkey, and satisfactorily fulfill the functions of the latter post. The revolutionaries of Turkey so far recognized this truth that, in the period immediately following the overthrow of the old regime, they put in the high places of government men of that regime chosen, as far as possible, for their administrative experience, capacity, and integrity. The idea was a sound one and it is surprising that they should have gone even so far. Unfortunately they could not shake off their habits—they could not change their spots. And there remained behind these ministers a secret organization—the Committee of Union and Progress—composed of revolutionaries entirely patriotic, democratic, and sincerely desirous of seeing Turkey governed in the interests of all the races inhabiting the country, but utterly devoid of administrative experience. The result is a matter of history, and could have been, and was, a matter of safe prophecy.

The Russian revolutionaries have not shown even as much sagacity as was exhibited by the Turks. They have endeavored to govern a vast empire and to conduct a great war by means of

men inexperienced in affairs, of untried capacity, and, as might have been expected, of the narrowest ideas. While some of those who have succeeded in jeopardizing, if not yet in destroying, the achievements of the democratic revolution are suspect, the vast majority of these infatuated persons are perfectly sincere. It is characteristic of the individuals composing a revolutionary body that they ride to death the hobby-horses of their ideals. They do not understand compromise, and they cannot believe that the doctrinaire is not necessarily capable of acting as a competent executive.

The revolutionary is like an animal which can think only in terms of space of one dimension, steadily refusing to admit the possibility of any other extensions. For a very pertinent example of this let us look at the famous case of the Lyons Mail in the time of the French Revolution. You will remember that a man accused of highway robbery was condemned to death, and, although his innocence was completely established before the time came for his execution, he was nevertheless guillotined because the right of pardon had been abolished and because "the Supremacy of Law" was one of the fundamental principles of the Revolution, and Law had condemned him.

MERCURY BICHLORIDE POISONING—A CORRECTION AND AN ADDENDUM.

In the collective abstract dealing with acute poisoning by mercuric chloride which was published in the November issue of the *INTERSTATE* the following passage, taken from Weiss's paper, was inadvertently attributed to Brown and Baskett: "As our observations were begun for some months before Lambert and Patterson's work appeared, and as we had obtained satisfactory results without the gastric and colonic lavage recommended by them, we have felt justified in omitting it."

Dr. Weiss, in kindly drawing my attention to this error, at the same time points out that in the same article "grains" was printed in mistake for "grams" in the formula of the bitartrate drink. This should, therefore, read as follows:

Cream of tartar (potassium bitartrate).....	4 grams.
Sodium citrate.....	2 grams.
Sugar.....	2 grams.

Orange or lemon juice to taste; water, 8 ounces. The salts are added just before serving.

This is one more example of the danger which lurks in the mixing, in the same formula, of metric weights and measures with those of the other systems.

This opportunity serves me to supplement the abstract in question. Since its publication an article, by Haskell and Courtney, has appeared in *The Journal of Laboratory and Clinical Medicine* for November, dealing with calcium sulphide as an antidote in bichloride poisoning. The conclusions of these authors are that the intravenous injection of calcium sulphide is a procedure fraught with actual danger, and that it is possible that cases of mercurial poisoning may have the lethal exitus hastened rather than prevented by this administration of calcium sulphide.

In the abstract this method of treatment was intentionally omitted. There seems no sufficient reason to change the recommendations made in the conclusions of my article.

COLLECTIVE ABSTRACTS

THE ORTHOPEDIC SURGEON AND RECONSTRUCTION.

BY ARCHER O'REILLY, M.D., F.A.C.S., of the Editorial Staff.

As the war progresses, the orthopedic surgeon is becoming an ever greater factor in the treatment of many of the wounded. In England, at first, little attention was paid to orthopedic treatment, but now, as a result of the convincing work of Sir Robert Jones, there are a number of orthopedic war hospitals and many private institutions where orthopedic treatment is given and where crippled soldiers are reeducated in a trade or occupation. This is also true in France, Canada, Russia, Italy, and Germany.

In the United States the orthopedic surgeon early recognized the important rôle that this specialty would have to play. As a result of the work of the Committee on Preparedness of the American Orthopedic Association and the Section of Orthopedic Surgery of the American Medical Association, and the cooperation of the surgeon general's office, orthopedic surgery has already been recognized as one of the most important branches of the medical department.

The object of this abstract is to review some of the work that the orthopedic surgeon must do and has done at the present time, and the work that has been done in reconstruction.

The orthopedic surgeon, according to Silver,¹ is at a very critical period on account of the vast responsibilities before him, and at present he has four rôles to take:

"1. In the creation of the army in teaching the rudiments of orthopedic surgery to medical officers, the care of the feet, the application of splints, and the various methods of securing immobilization. This should be done at the training camps."

"2. It is important that orthopedic materials, apparatus, and methods should be simplified and standardized, so as to make them more readily applicable to the difficult conditions of modern warfare and offer a wider field of usefulness."

"3. The orthopedic care of wounded at base hospitals. This work has already advanced far, and the only difficulty is in securing and training enough men for this work."

"4. The orthopedic surgeon has an important part in the reeducation of the crippled, in making him capable of taking up some useful employment; thus not only conserving his value, in some measure, to society, but, much more, assuring him the right-minded attitude toward his fellows and toward life in general."

The orthopedic surgeon should also look after the great "industrial army," and, by instruction in the proper development and use of the body, in the care of the feet, and the choice of shoes, prevent excessive strain, and thus keep the workers in the highest state of efficiency. The orthopedic surgeon is also of great value to the army, not only during its organization, but even while in the trenches, in looking after the feet of the soldiers and

their shoes. By the proper care of the feet a higher degree of efficiency can be obtained.²

In Europe the work of the orthopedic surgeon has been clearly recognized, especially in taking care of the crippled soldier and in restoring him to usefulness. In fact, the latter phase of the work has been called reconstruction, and reconstruction hospitals, where this work is done, are assuming greater national importance every day. In one of the English orthopedic hospitals, out of 1,350 cases discharged in one year, 997 were returned fit for the army.³

Sir Robert Jones,^{4 5} states that the effects of severe wounds by modern explosives have so frequently given rise to deformities and disabilities requiring orthopedic treatment, and the whole question of dealing with the disabled man and fitting him for a useful future has assumed such proportions, that it has become necessary to establish orthopedic centers in several parts of England. The object of these centers, or workshops, is to provide for the reeducation of disabled physical functions as rapidly as possible on clearly established lines, to make the man fit once more to take his place in the nation either as a soldier or a worker.

"These workshops have already proved to be of very real value, and are the latest, but not least important, advance in the orthopedic treatment of wounded men suffering from physical disabilities of their limbs."

"By the time a soldier has passed through various phases of recovery from septic wounds in several different hospitals, and is finally transferred to an orthopedic center for treatment to correct deformity, and restore the use of injured joints and muscles, his spirit is often broken. The shock of injury, frequently in itself severe, followed in succession by a long period of suppuration and thereby a wearisome convalescence, during which he receives treatment by massage and electricity, or by monotonous movements with mechanical apparatus of the Zander type, too often leaves him discontented with hospital life, its monotonous round of routine, and its long periods of idleness."

"In the orthopedic center he finds his fellow patients busily engaged in employments in which they are doing something, and it is not many days before he asks for a job."

"Thus, when the preliminary stages of operative and surgical treatment are over, there is a steady gradation through massage and exercise to productive work, which is commenced as soon as the man can really begin to use his limb at all. If his former trade or employment is a suitable one, he is put to use tools he understands; otherwise some occupation suitable for his disability, and curative in its character, is found for him."

"Men with stiff ankles are set to drive a treadle lathe or fret saw. If they are put on a treadle exercising machine, the monotony soon wearies the mind, but if the mind is engaged, not on the monotony of the foot work, but on the interest of the work turned out, neither mind nor body becomes tired."

"Men with defective elbows and shoulders find exercise and mental diversion in the carpenter's and blacksmith's shops. If their hands and fingers are stiff, working with a big swab to clean windows or with a paint brush is a more interesting occupation than gripping spring dumb bells."

"Those of us who have any imagination cannot fail to realize the difference in atmosphere and morale in hospitals where the patients have nothing to do but smoke, play cards, or be entertained, from that found in those where, for part of the day, they have regular, useful, and productive work."

"Massage and exercise is no longer a mere routine; it all fits in and leads up to the idea of fitness—fitness to work and earn a living, and serve the state in an economic sense, even if not to return to the regiment and fight once more in the ranks of the army."

Metcalfe⁶ states that there have been ten orthopedic or reconstruction hospitals organized in Great Britain—four in England at London, Liverpool, Leeds, and Bristol; three in Scotland at Aberdeen, Glasgow, and Edinburgh; two in Ireland at Belfast and Dublin, and one in Wales at Cardiff

He believes that the curative workshop is one of the most important branches of the orthopedic hospital, and one of its greatest assets is that a patient's task crosses the shadowy demarcation of work—as he regards pulling a chest weight—and becomes play. All the reconstruction hospitals are organized along similar lines.

The Shepherd's Bush Hospital,⁷ one of the largest English orthopedic hospitals, has 1,100 beds, with a staff of five chiefs and necessary assistants, each chief the head of a service, and all under the direction of a major, who acts as superintendent, disciplinarian, and business head. The hospital is divided into two blocks—one for the severe cases, with a head nurse for each two wards, and three or four nurses with voluntary assistants. While waiting for operation or while convalescing (if able to be out of bed), the patients are transferred to the other block, where they care for each other, under the direction of two head and two or three ordinary nurses. At night the block is in charge of orderlies. There are also tents, where many of the convalescents live. The hospital is equipped with a large massage department, gymnasium, hydrotherapeutic plant, and electric department, each in charge of an expert. The men work in them on a regular schedule. There are also large workshops for woodworking, forge, splintmaking, repairshop, artificial-limb-making, etc. In these the patients work regularly, with a fourfold object: (1) to keep the men busy and keep their minds off their disability—for the psychic effect; (2) work provides one of the best means of securing passive and active motion and massage; (3) work keeps a man at his trade and goes far to teach him a new one; (4) the product of the shops supplies many of the needs of the hospital.

In England it is impossible to make a man work in the shops unless he wants to. This was quite a difficulty at first, but now the patients are beginning to realize its value. The tendency to increase production by making a man work at an occupation for which he was best fitted, without regard for the curative effect, has been overcome by putting a medical man over the work.

In Canada⁸ the war was not long in progress before it was realized that orthopedic surgery would play an important part. An orthopedic hospital for Canadian soldiers was established at Ramsgate, England, and later hospitals were established in Canada for permanently crippled soldiers or for those that would take several months to be cured. The types of injuries cover a wide field and call for a wide experience and special technic in operative surgery.

The application of artificial limbs is a most serious problem. The government established a large artificial leg factory in Toronto, to which center all the cripples are sent. Here the stumps are allowed to heal, reamputations are performed when necessary, stiffened joints above the amputations are restored to motion, atrophied muscles are strengthened by massage and therapeutic exercise, and the stumps are shrunken, preparatory to fitting with the artificial leg. When the limbs are finished, they must be passed by a medical officer. The patient is then either given his discharge from the army or becomes a ward of the Pensions Committee, or he joins the classes in vocational training.

In order to solve the problem of upkeep of the numerous artificial limbs, the government has taken into the factories a number of men who have had amputations. When their instruction is complete, it is intended to send them to various places throughout the Dominion, there to establish centers where small repairs can be made, measurements taken for new limbs and these be properly fitted.

Vocational training is one of the great national problems. Every military hospital center is provided with vocational officers, instructors, shops, schools, laboratories, etc., all aiming at restoring the crippled soldier to a state of usefulness to the community.

It has been recognized that nothing else helps the crippled soldier so much as to make him able to help himself. When the soldier is sufficiently convalescent to become interested in these matters, he is interviewed by a vocational officer, who assists him in deciding what is the best course to pursue after his discharge from the army. Courses in the elementary school work, preparatory to entry into civil service, courses in telegraphy, stenography, and mechanical and structural draughting have been established, and are well attended. In the technical schools, courses in carpentry, machine shop work, electricity, and so on, are being conducted successfully.

In France⁹ the orthopedic and reconstruction work is very similar to that of England and Canada. Usually reeducational work is taken up after the soldier has been discharged from the army, and is very largely carried on by private or semiprivate charity. There is an orthopedic hospital for each military area. These hospitals are near centers where artificial limbs are made. Soldiers needing artificial limbs are sent to these hospitals, where stumps are prepared and necessary secondary operations performed. Here also functional reeducation is undertaken. Reeducation should begin as soon as possible, but it is usually not commenced until after actual hospital treatment has done all it can. The work is prescribed by a physician. Work properly selected and graduated has a high psychic value, and constitutes the best possible means of reeducating muscles to action—the psychical part of functional reeducation.

Mayer¹⁰ believes that in America we should profit by the work done in England, Canada, France, and Germany, and be prepared to care for war cripples. The injuries that cause these conditions are amputations, bone injuries, joint lesions, nerve injuries, division of tendons, and static deformities of all kinds. These all require lengthy treatment, and the patients must be given effective after-treatment.

The orthopedic reconstruction hospital must include departments not thought of in peace time. These are a workshop, agricultural school, and business college. It is also advisable to teach men with artificial limbs their proper use. In addition to the curative and psychological effect of work, workshops are a distinct economical advantage to the hospital, as much of the work and supplies can be furnished by the patients, and in war times the brace-maker's shop is particularly useful. An employment bureau is a necessary adjunct.

It is distinctly advantageous to have these departments a part of the hospital instead of establishing separate institutions. Time is saved, and work can be begun at the psychological moment. The vocational work should include not only shops, but also courses in farming and dairying, business training for social service examinations, etc. "For every man, no matter what his previous calling has been, the hospital should offer some means of instruction that will enable him, despite the physical disadvantage he has suffered, to leave the hospital a more productive member of the community than at the time of his enlistment."

Charts A and B¹¹ give the scope of a reconstruction hospital as conceived for Reconstruction Hospital No. 1 of Boston.

That the surgeon-general^{12 13} realizes the important part played by orthopedic surgery is shown by the interest he has taken in the matter. On August 20, 1917, a Department of Military Orthopedics was organized. Major E. G. Brackett, M.R.C., was appointed director, and Major J. E. Goldthwaite, M.R.C., was appointed director of military orthopedics for the expeditionary forces.

In announcing the creation of this department, the surgeon-general states that from 30 to 40 percent of the casualties of the present war require special orthopedic treatment, and that, when so treated, 70 to 75 percent of the cases can be restored to military usefulness. The classification adopted of conditions considered orthopedic is practically the same as that in use by the British government, and is as follows:

- a. Derangements and disabilities of joints, including ankylosis.
- b. Deformities and disabilities of the feet, such as hallux valgus, hallux rigidus, hammer toe, metatarsalgia, painful heels, flat and claw feet.
- c. Malunited and ununited fractures.
- d. Injuries to ligaments, muscles, and tendons.
- e. Cases requiring tendon transplantations or other treatment for irreparable destruction of nerves.
- f. Nerve injuries complicated with fractures or stiffness of joints.
- g. Cases requiring surgical appliances, including artificial limbs.

An advisory committee, called the active vocational board, has been appointed for the development of the so-called curative workshop, which is a natural part of the general orthopedic equipment.

In addition to the large field of orthopedic and reconstruction work that will be required when actual fighting commences, the orthopedist is being used in preparing the army for its work and in instructing the other medical officers. As far as possible, they have been detailed in the following manner¹⁴:

- a. In giving standardized courses of instruction to medical officers (and line officers when practicable) in foot efficiency of the soldier, with a view to developing proficiency in the examination of the trunk and locomotor apparatus of the great number of recruits being taken into service, so as to eliminate the unfit, detect malingering, and direct prophylactic measures for rendering men having slight abnormalities fit for military service.
- b. In conducting orthopedic examinations of prospective medical officers and line officers now undergoing training in the various camps.
- c. In acting as consultants to the surgeons in charge at large camps.
- d. In conducting orthopedic physical examinations and treatment of such men in the camps as may be referred for this purpose by the surgeon.

In order that there may be enough orthopedic surgeons, men who have had good surgical training are being enlisted and given intensive courses in orthopedic surgery of six weeks' duration at special schools in Boston, New York, and Philadelphia, followed or preceded by camp instruction in orthopedic surgery and by a course in the medical officers' training camps. This is an eighteen weeks' course and fits men for service in foreign fields.¹⁵

Whenever possible, men sent abroad will be placed in the British orthopedic hospitals, and will work with the surgeons in charge until they are needed with the United States troops.

The orthopedic service in our army will differ from that of the foreign troops in that the orthopedic division will have men located in all hospitals from the dressing station back to the base hospital. Thus it is planned to avoid many of the disabling deformities which occur by handling all cases by men who are unfamiliar with orthopedic principles, that have been so crippling to the forces of England and France.

A number of orthopedic hospitals of 2,500 beds each, sufficient to meet the demands, will be built in France; these will be fitted with curative workshops.¹⁶

In addition to the orthopedic hospitals to be established in France, the government has decided on reconstruction hospitals in eighteen of the principal American cities, to which permanent cripples or those whose convalescence will be protracted will be sent. These hospitals will have five hundred

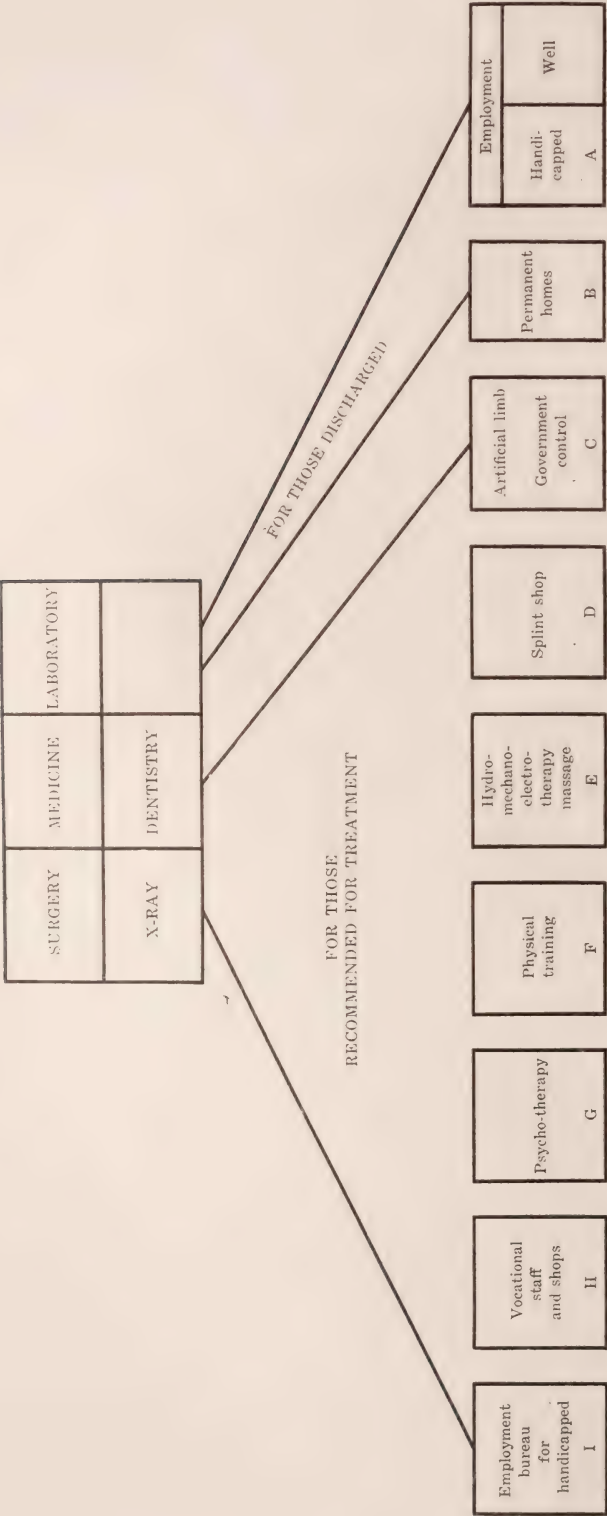


Chart A.—Organization of reconstruction unit. Necessary equipment.

beds, with provision for doubling that number. Industrial training will be taken up, and additional educational facilities will be furnished to those fitted for them. Workshops and employment bureaus will also be furnished.¹⁷

In connection with the reeducation of war cripples, the surgeon-general's office has sent a circular to county medical societies and hospitals, asking for a list of the industrial cripples treated, and asking for a report on what they are now doing.¹⁸

The information desired in reference to each case should include (a) character of disability, medical and surgical; (b) the work at which the patient is employed and the degree of success; (c) the way in which he learned or

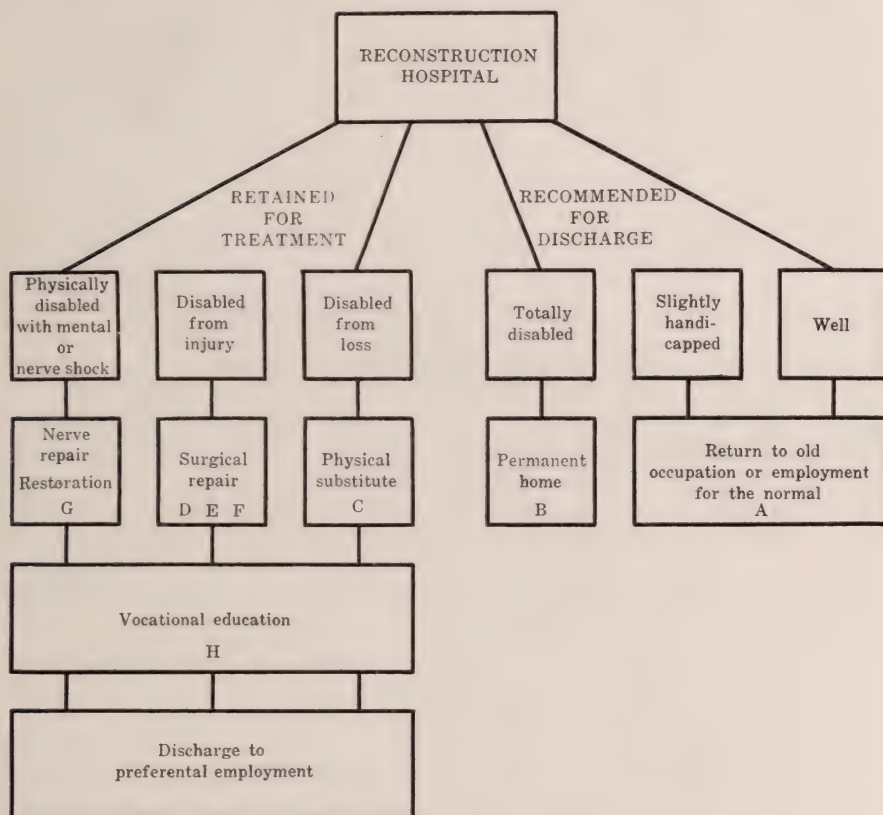


Chart B.—Organization of reconstruction unit. Base hospitals.

entered his occupation after his injury or illness. The names of the disabled are not necessary.

If any man who has been successful after an injury or illness desires to write a short autobiography, stating his experience, it will be very useful, and will be utilized in preparing a booklet to be distributed to the men at the proper time.

Such a book has been published in England¹⁹ and is distributed to disabled British soldiers and sailors. It explains what has been done for the disabled, and points out the advantages of reeducation. In the European armies there has been some hesitation in taking up reeducational work because the men feared that if they were able to work it would interfere with their pensions. This booklet clearly states that this is a fallacy, and says, "Let it be distinctly

understood that, once your disability has been determined and your pension is fixed, no reduction whatever can be made on account of anything you may earn. It is therefore 'up to you' to make your earning capacity as large as possible. The opportunity is too good a one to be neglected."

A number of autobiographies are attached. One man writes: "I had already been in the Royal Marines nine years when the war broke out. We went to the Mediterranean and then to Gallipoli, where I was badly wounded and lost my right leg (very high amputation). My previous occupation having been that of a gardener, I began to wonder what I should do. I then joined a special course of electrical work while in the hospital and went to a training center after leaving, and got on so well that I got a good job at the C. A. V. Magneto Works, where I am doing very well. The work I have to do suits me, as I can sit down at it. I would advise everyone who cannot go back to his old job, to learn a trade. I am earning more now than I did before I joined up, apart altogether from my pension."

In Europe^{20 21 22 23} the work of reeducation is conducted mainly by private or semiprivate organizations after the soldier has been discharged from the army. All the writers agree that the psychological effect of work is most beneficial, and that the long periods of inactivity in hospitals are most depressing. It is also the general opinion that the government should be responsible for the reeducation of the soldier, and that it is its duty to see that they are rendered self-supporting, and as near as possible 100 percent efficient. At present the crippled soldier can easily get employment on the basis of patriotism and sympathy, but in a few years, when the memory of the horrors of the war has become less vivid and the struggle for existence has again become acute, the laboring man will be less sympathetic with the disabled, and, unless he has been fitted to maintain his place in the struggle, he will gradually be sifted out, and in his old age he will become a ward of the state and a discontented citizen.

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THE INTERNAL SECRETION OF THE OVARY.

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Although the internal secretion of the ovary was among the earliest of the hormones whose existence was recognized, surprisingly little exact knowledge concerning this important substance exists. The existence of an internal secretion of the ovary is established beyond dispute by the definite and constant train of symptoms which follows operative removal of the ovaries or their atrophy at the physiological menopause.

Immediately after birth the sexual organs of the baby are not infrequently congested, as shown by swelling of the breasts or discharge of blood from the vagina (Frank).¹ These last but a short time. We know that the ovarian hormone is active during childhood by the differences in the body and facial appearance of the female child. At puberty the ovarian secretion is very active, and marked changes take place in the body. In general these may be divided into:

1. Development of the secondary sexual characteristics—features, voice, development of breasts, quality and distribution of body hair, etc.
2. Skeletal changes—development of the female type of pelvis, lighter general skeletal development.
3. Establishment of the menstrual cycle.

The period of sexual activity of the ovary lasts from thirty-five to forty years, and is followed by atrophy and diminution in the ovarian secretion producing the well known symptoms of the menopause. Similar symptoms may be produced by the operative removal of the ovaries during sexual activity. Graves² believes that there is much superstition connected with the symptoms of the menopause (natural or postoperative). According to Graves the true ablation symptoms are hot flushes, sweating, palpitation, headaches, sleeplessness, hysterical and psychoneurotic manifestations. Graves believes that the accumulation of fat, sexual insensibility, and acquisition of male characteristics, which are commonly described as symptoms of the menopause, are mythical.

Following removal of the ovaries there is, however, a gain in weight and a diminution of metabolic activity. Curatulo and Tarulli,³ in 1895, showed that after castration of a female dog there was a gain in weight of 17 percent. They obtained the same result in mice. In all these animals there was a diminished oxygen consumption and carbon dioxide excretion. There was also found to be a diminished excretion of phosphorus in the urine. This last observation bears out Fehling's treatment of osteomalacia by ovariectomy.⁴

Loewy and Richter⁵ found that removal of the ovaries in a female dog was followed by an increase in weight and a diminished metabolism. Following the administration of ovarian extract metabolism again increased. Murlin and Bailey⁶ have recently confirmed their results in experimental work also on dogs, finding a gain in weight of 600 grams and a diminution of metabolism amounting to over 14 percent on the basis of calories per kilogram hour.

Zuntz⁷ studied the metabolism before and after removal of the ovaries in four women upon whom it was necessary to perform ovariectomy for pathological pelvic conditions. All had reduced metabolism. To two of the patients ovarian extract was given with increase of metabolism.

Taniguchi⁸ studied the chemical composition of extract of ovary. He found

the following substances—a ferment which split yeast nucleic acid, forming phosphoric acid and purin bases; also an erepsin-like ferment; an abundant amount of amylase; urease; an asparagin splitting ferment; a ferment resembling trypsin; a butyl-ether splitting ferment; a small amount of salicin splitting ferment; and a slight amount of amygdalin-splitting ferment. These same chemical substances were found both in extracts of corpus luteum and in extracts made from parts of the ovary freed from corpus luteum.

There is much variation of opinion as to what portion of the ovary secretes the hormone. The two most probable sources of the internal secretion of the ovary are:

1. The corpus luteum.
2. The interstitial cells.

The Corpus Luteum.—Born in 1900,⁹ was the first to advance the idea that the corpus luteum might be the source of the ovarian secretion, basing his conclusions on the histological structure of the corpus luteum of pregnancy. He expressed the opinion that it resembled in its microscopic appearance the glands of internal secretion elsewhere in the body.

Fraenkel, 1903,¹⁰ went still farther in elaboration of this theory. After some experimental work he concluded that the increase in growth of the uterus at puberty and the cyclic changes of menstruation were caused by the action of a secretion produced by the corpus luteum. He believed that the direct effect of this secretion is the preparation of the uterus for pregnancy, but that when pregnancy does not take place the corpus luteum atrophies and menstruation proceeds. When pregnancy does occur the corpus luteum attains large size and persists.

Meyer and Ruge¹¹ in 1911 described cyclic changes in the corpus luteum closely analogous with those in the endometrium as follows:

Hyperemic stage beginning 8 to 12 days after onset of menstruation corresponding to interval stage of endometrium.

Vascularization beginning 14 to 16 days after onset of menstruation corresponding to premenstrual stage of endometrium.

Efflorescence beginning 17 to 28 days after onset of menstruation corresponding to condition of endometrium just before menstruation.

Regression during menstruation and for 8 days following corresponding to menstruating stage of endometrium and immediate postmenstrual period.

Seitz, Wing, and Fingerhut¹² claim to have isolated a tryptic substance and antithrombinogen from the menstrual blood and also substances in the corpus luteum having antagonistic action. According to these writers when pregnancy fails to take place the corpus luteum begins to retrogress, these antagonistic substances are not produced and menstruation occurs.

Loeb¹³ has shown that the corpus luteum also prevents ovulation. Raymond, Pearl and Surface¹⁴ have shown that injection of extract of corpus luteum in the fowl delays ovulation. Extirpation of the corpus luteum accelerates ovulation in the fowl and this occurs also in the opposite ovary showing that the action is chemical rather than mechanical.

Loeb¹⁵ ligated the tubes in animals after copulation, thus preventing the ovum from reaching the uterus, and then irritated the uterine mucosa by mechanical stimulation and thereby produced a placenta at the site of stimulation. He thus proved that the corpus luteum produces a secretion that sensitizes the endometrium and when the mechanical irritation of the fertilized ovum is added the placenta is formed.

Fraenkel¹⁰ showed that removal of the corpus luteum during the early weeks of pregnancy caused abortion, but Loeb¹⁵ proved that later in pregnancy the corpus luteum could be removed without affecting the ovum. If the corpus luteum is thus removed or destroyed during pregnancy ovulation recommences, but is not accompanied by decidual reaction.

After the third month of pregnancy retrogression of the corpus luteum takes place very slowly so that it is still recognizable at the end of pregnancy.

Attention has been called to the possible relationship of the corpus luteum to the nausea and vomiting of pregnancy by Hirst¹⁶ and Graves.¹⁷ The former called attention to the fact that the period of greatest nausea corresponds almost exactly to that of the development of the corpus luteum of pregnancy that is to say up to the third month. After the third month there is usually coincident cessation of the nausea and vomiting, and retrogression of the corpus luteum. Hirst's theory is that during the non-pregnant state the woman is almost constantly absorbing from a retrogressing corpus luteum, and after the third month of pregnancy she is also absorbing from a retrogressing corpus luteum, but that during the first three months of pregnancy the corpus luteum is developing and she is deprived of the products of this retrograde change, therefore she vomits. To confirm this theory he reports twenty-five cases of nausea and vomiting of pregnancy treated with extract of corpus luteum with beneficial results in 84 percent.

Graves, on the other hand, found that the extract of corpus luteum from pregnant animals produced severe gastrointestinal symptoms when administered to patients, and he believes that the internal secretion of the corpus luteum has much to do with producing the nausea and vomiting of pregnancy.

In conclusion it may be said that it is agreed by practically all writers that the corpus luteum is an organ of internal secretion. The great point of disagreement, however, is whether it is the sole source of the ovarian hormone or hormones, or whether the ovarian secretion is more complex and made up of substances derived from various portions of the organ. In favor of this latter view numerous observers have pointed to the fact that there is abundant evidence that the ovarian secretion is active before puberty, at which time the formation of corpora lutea has not begun. It remains, therefore, to discover in what other part of the ovary the hormone may be produced. This Graves and others have found in the interstitial cells.

The Interstitial Cells.—These cells are found in the connective tissue of the ovary. They are large and polyhedral in form and are not unlike the lutein cells of the corpus luteum. They were first discovered by Pfluger in 1863, but it was Limon¹⁸ who finally recognized their origin from the lutein cells of atretic follicles. (Atresia of follicles exists in the new born and goes on up to the menopause.) In some animals as the rabbit these cells become arranged in glandlike masses constituting the so-called interstitial gland. This interstitial gland is not found in the human ovary. According to Bouin and Ancel it is found only in animals which do not ovulate except after coitus, while in those, as the human, which ovulate periodically the corpus luteum exists but not the interstitial gland.

It has been objected that the interstitial cells being of connective tissue origin are not of the endosecretory type. This objection Graves has answered by pointing to the cells of Leydig in the testicle which are of connective tissue origin, but are generally accepted as the source of the testicular hormone.

Graves concludes that for therapeutic purposes ovarian extracts should be made from the whole gland in order to include the secretion both of the corpora lutea and the interstitial cells. Practically he has found such preparations more efficacious.

Relation of Disturbed Ovarian Secretion to Disorders of Menstruation.—As it has been pointed out that the menstrual cycle is immediately dependent upon the ovarian secretion and is directly controlled by that part of it derived from the corpus luteum, it naturally follows that pathological conditions of the ovary will often result in disturbances of menstruation. Novak of Baltimore,²⁰

in nineteen cases showing marked development of the paralutein cells, found in all except a few profuse and in some instances irregular menstruation. Hitschman and Adler²¹ have tried to show that the great majority of cases of irregular and profuse menstruation are due to pathological conditions involving the ovary. Clinically it has been recognized for a long time that menorrhagia and metrorrhagia frequently occur in diseased conditions of the adnexa such as salpingitis, ovarian cyst, etc. Hitschman and Adler would explain all these cases by a stimulation of the ovarian secretion as a result of the pathological condition of the ovary. In this connection I. C. Rubin²² has reported three cases of delayed menstruation associated with corpus luteum cysts simulating the symptoms of ectopic pregnancy.

Ovarian Hormone Therapy.—This important practical aspect of the various problems of ovarian internal secretion may be considered under three general headings:

1. Treatment with ovarian extract.
2. Retention of ovaries after operations on the uterus and adnexa.
3. Ovarian transplantation.

In general the greatest amount of ovarian therapy has been directed toward the relief of symptoms of the menopause natural or postoperative.

Treatment with Ovarian Extract.—There are numerous preparations both of extract of the whole ovary and of the corpus luteum on the market, and numerous conflicting reports of the efficacy of these different or like preparations are to be found. It seems obvious that in our meagre knowledge of the composition of the ovarian hormone and in lack of exact methods of preparation such discrepancies are to be expected. Graves and Bandler²³ report better results from the use of the whole gland. On the other hand in the same discussion Leighton²⁴ said that he had had good results only with the extract of corpus luteum. Novak²⁵ also inclines to the corpus luteum but has not had brilliant results. My own experience has been that many preparations on the market are absolutely inert. In a few cases using a preparation made from the whole gland and known to be fresh, I have found the extract to be practically a specific for the vasomotor disturbances, although with little effect on the nervous manifestations. Graves believes from his experience that preparations made from the ovaries of pregnant animals without the corpus luteum are more efficacious than ordinary ovarian extract. He has had especially good results in the treatment of circulatory disturbances of the external genitals, kraurosis vulvae, by ovarian extract.

Retention of Ovaries After Operations on the Uterus and Adnexa.—In 1915 Vineberg²⁶ first threw doubt on the value of leaving normal ovaries in situ after hysterectomy. Up to that time it may be said that surgeons and gynecologists were practically unanimous in leaving one or both ovaries after hysterectomy, although it was recognized that in pelvic inflammatory conditions not infrequently a normal ovary left behind would later become infected and require a second operation. Vineberg stated as his belief that a considerable number of normal ovaries retained after hysterectomy later become cystic and require removal, and raised also the question of whether the internal secretion of such ovaries might not be stopped because of the traumatism inflicted upon the nerves supplying them in the course of the operation.

Still more recently Graves² has claimed that in his experience after removal of the uterus vasomotor disturbances had occurred with equal frequency whether the ovaries were removed or not. Tuffier²⁷ explains this as follows: every month a certain substance is produced and enters the blood stream, finally accumulating in sufficient amount to act on the ovary which modifies it by its internal secretion and menstrual flow is produced. This modified secretion is, however, eliminated in the menstrual blood and the flow then

ceases. If, however, menstruation does not occur because of deficient ovarian secretion this substance is retained in the circulation and causes the symptoms of the menopause. As proof of this Tuffier cites two cases in which after injection of blood serum taken from a healthy patient on the day before menstruation, menstruation returned and the symptoms of the menopause disappeared.

It seems certain that ovaries left in situ after removal of the uterus atrophy. That this can not be entirely explained by disturbance of the blood supply will be shown in connection with the subject of ovarian transplantation for as will be seen a transplanted ovary will often grow when temporarily deprived of all its blood supply.

Ovarian Transplantation.—This may be considered under three heads:

Heterotransplantation or the transplantation of ovaries from one species to another.

Homotransplantation or transplantation from another individual of the same species.

Autotransplantation or transplantation of the ovary to another part of the body in the same individual.

Heterotransplantation. Reports of heterotransplantations are few and unsatisfactory. The only cases in which I have been able to find reports of its performance on women were those of Tuffier,²⁷ seven in number, all failures.

Homotransplantation.—Homotransplantation in animals has met with some degree of success. Castle and Philips²⁸ transplanted ovaries in 141 guinea pigs. Only 3 produced young from the transplanted ovaries. In 7 others ovarian tissue was found after some months. In 87 of the animals no trace whatever of the transplanted ovary could be found when autopsied. These same investigators²⁹ removed the ovaries from an albino guinea pig and in their stead transplanted ovaries from a black guinea pig. The albino female was then mated to an albino male and later bore two black pigmented young. These writers state that in an extensive experience they had never seen black young produced where both parents were of the albino type, showing that the hereditary characteristics were retained by the transplanted ovaries and were not influenced by their new host.

Guthrie and Lee³⁰ transplanted ovaries of two sister puppies to each other. One was lost. The other animal was autopsied 18 months later and showed one ovary normal and containing normal histological elements including corpora lutea.

Engel³¹ transplanted the ovary from a myoma case into a woman of 27, who had previously had both appendages and uterus removed with severe surgical menopause. He states that restoration to complete health followed, but there was no opportunity for histological examination of the transplanted ovary.

Tuffier²⁷ did 24 homotransplantations without a single successful result. Martin,³² after an exhaustive review of the subject, concluded that while the results of homotransplantation were poor the occasional successful case should offer some encouragement for future success with improved technic. Tuffier explains the failure of homo and hetero transplantation by the resistance of the patient's blood for foreign tissue. He quoted Carrel as stating that transplantation of limbs is more successful if the receiver is infected. It is probable that in this state the macrocytes are struggling with the infection and do not have strength to attack the foreign tissue. In this connection we can not overlook the work of Lydston,³³ although working mostly with testicles rather than ovaries, but whose transplantation work has met with remarkable success.

Autotransplantation.—The ovary left in situ after pelvic operations, as we

have seen, is prone to degenerations and to reinfections. To remove it in such case means another abdominal operation. Therefore in these cases autotransplantation into the abdominal wall, if successful, obviates the ill effects of leaving an ovary where it is likely to degenerate or where it is in the path of infection. The technic is simple. The ovary is simply removed entire and after closing the peritoneum of the abdominal wall is inserted beneath the rectus muscle, or it may be left in the subcutaneous fat. More elaborate techniques with the idea of anastomizing blood supply have not been more successful. Tuffier²⁷ reported the results in 37 cases of autotransplantation one to six years later. All but five had regular menstruation. In all but two cases menstruation returned within six months following the operation. Transplantation of one or both ovaries did not influence the result. In four cases he had the opportunity of removing the transplanted ovary from two to four years after the operation. Three showed evidence of growth and function as follows: One had a corpus luteum, one a cystic follicle, one a blood cyst resulting from a corpus luteum. The fourth had undergone fibrous degeneration. Following the operation, as a rule, no change in the patient's condition was noted for two to four months. Then the ovary could be noted to enlarge for six to seven days, after which menstruation reappeared and the symptoms of the surgical menopause coincidentally disappeared. In five cases the patient had a natural menopause from 13 to 30 months afterward.

He did 84 transplantations following hysterectomy and these all seemed successful so far as being able to palpate the ovary in the abdominal wall afterward, but the patients received no benefit. Tuffier's explanation of this fact we have already spoken of.

Martin,³² Davidson,³⁴ Grayes,³⁷ Phillips,³⁵ Natrass,³⁶ and many others have reported successful cases of autografts. For a complete bibliography of these Martin's several papers should be consulted.

Malcolm Storer³⁸ of Boston, alone has reported a case of pregnancy following ovarian transplantation in the human female. His patient had previously had both tubes and one ovary removed for gonorrheal salpingitis. The patient being desirous of having children, he opened the abdomen and transplanted half of the remaining ovary into the uterus in relation to uterine cavity. Nine months later he had to remove the half of the ovary which had been left in situ and a peritoneal cyst. The patient menstruated regularly up to three months after this latter operation, when menstruation ceased and the following symptoms of pregnancy appeared: enlargement of the uterus, blueness of the vagina, nausea. When three and a half months along she passed a mass of detritus by the vagina and the uterus decreased rapidly in size. Although no histological examination of this mass was made, Storer considered it an undoubted miscarriage. Following this phenomenon the symptoms of the menopause appeared and hysterectomy was done later in another city, but the patient died.

SUMMARY.

It is universally admitted that the ovary produces an internal secretion. This internal secretion presides over the secondary sexual characteristics, the skeletal differences, the menstrual cycle, and the development to a certain extent at least of the fertilized ovum. Following removal of the ovaries during sexual activity there is a decrease in metabolism, a gain in body weight, cessation of menstruation, and the development of certain nervous and vasomotor symptoms.

The internal secretion of the ovary is in part produced in the corpus luteum, and probably in part in the interstitial cells. The corpus luteum controls the menstrual cycle and presides over the development of the decidua and forma-

tion of the placenta. It probably has some connection with the nausea and vomiting of pregnancy. The interstitial cells probably produce a secretion which controls the development of the secondary sexual characteristics.

Ovarian hormone therapy with ovarian and corpus luteum extract has on the whole been disappointing largely because of unreliability of the various preparations. A good preparation of the whole gland acts almost as a specific in the vasomotor disturbances of the menopause.

The symptoms of the postoperative menopause where the uterus is removed occur with equal frequency whether the ovaries are removed or left in situ. Heterotransplantation of the ovaries has met with complete failure. Homotransplantation has met with some success in animals but is only occasionally successful in the human subject. Autotransplantation in the human subject has met with a considerable proportion of success, but is not of much help to the patient if the uterus has been removed.

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ORIGINAL ARTICLES.

THE PLACE OF THE PROCTOLOGIST IN A DIAGNOSTIC GROUP.*

By ALFRED J. ZOBEL, M.D., F.A.C.S.,

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In 1907, at Atlantic City, through the courtesy of Dr. A. B. Cooke, then secretary, the pleasure was afforded me of attending for the first time a session of the American Proctologic Society. Today, a decade later, I am honored by being permitted to preside at its nineteenth annual meeting. Allow me to express my sincere thanks, and be assured of my grateful appreciation.

It is, however, in a most humble spirit that I approach my task, for I recall those who have been my predecessors, and am mindful that the name of each one stands out illustrious in the annals of proctology. Among them were the charter members of this society: Lewis H. Adler, Jr., William M. Beach, A. Bennett Cooke, Samuel T. Earle, George B. Evans, Samuel G. Gant, Thomas C. Martin, Joseph M. Mathews, J. Rawson Pennington, and the late lamented George J. Cook, and James P. Tuttle. These men were the pioneer teachers and practitioners of modern proctology. Through their tireless labors this special field of surgery, which before had been most woefully neglected by the reputable general surgeon, was rescued from the unworthy hands into which it had fallen. Through years of patient and continued effort, with the earnest assistance of all the other fellows of the society, they secured from the medical profession that recognition of proctology, as a specialty, such as they always deemed it deserved. It is most gratifying to be able to state that with the creation, in 1916, of a Section on Proctology, by the American Medical Association, their efforts have been crowned with success. It may also be said, in passing, that the American College of Surgeons, acting in accordance with the broad and liberal spirit in which it was conceived, has also given recognition to this specialty by conferring fellowships upon a large number of the fellows of this society.

Several of my predecessors, in their addresses, have deplored the fact that, with a few exceptions, none of the undergraduate medical schools give any adequate instruction in entero-proctology

*Presidential address at the nineteenth annual meeting of the American Proctologic Society.

by qualified men. In sharp contrast to this, we note that in every postgraduate medical school in this country there is a department of rectal and colonic surgery, whose existence is amply justified not only by the number of patients which it treats, but by the large attendance of postgraduate students who come to obtain instruction in a subject which, owing to the negligence of their Alma Mater, they know very little about. Those of us who are teachers in these schools are able to corroborate the statement that to most of the postgraduate students the anorectal and colonic region is a terra incognita. Many have never made an examination, while some have never before seen one made. The majority have never been taught to do it properly, and consequently are unable to interpret their findings after making it.

It is a sad commentary on the boasted progressiveness of the university medical schools that they fail to teach at least the fundamentals of this subject, by men qualified by training to impart it. While it may not be any part of their functions to train students to become specialists, yet it seems to me it is their duty to give such elementary instruction in all the special branches of medicine and surgery as will be sufficient to prepare their graduates to diagnose and treat, with some little familiarity, the more common conditions with which they are most apt to come in contact after they have taken up their professional duties.

I believe you will agree with me that these schools should no longer remain enwrapped in conservatism; that they should begin to realize that failure to impart instruction in enteroproctology and the other recognized specialties which have arisen in late years, impairs their standing as thorough teaching institutions, and that they should now take heed of the demands and needs of modern medicine. The American Proctologic Society should exert its influence as a body in an effort to bring them to see the light. Instead of trying to persuade them to teach enteroproctology by qualified instructors, as we have done in the past, we should from now on insistently demand that they do so.

This brings me to the main subject of my address: "The Place of the Proctologist in a Diagnostic Group." Up to about twenty years ago all the medical needs of a community were attended to by the so-called family doctor. But few men were surgeons, exclusively. Most of the latter, though often professing to be such, did not hesitate to treat medical cases. About the only specialists familiar to the laity were those who restricted their practices to the treatment of diseases of the eye, ear, nose and throat. As a rule, even these diseases were treated mainly by the general practitioner, who referred to the specialist in such cases only when he found it absolutely necessary.

There were already a few men who confined their endeavors

solely to specialization in one or other of the specialties, such as we are today so familiar with. These pioneers received only slight encouragement from their colleagues, and, as the work they were doing was unknown to the laity, their practices grew slowly. Their patients were, in the main, those who were referred to them by the most progressive and conscientious practitioners in their community, such men who always place their patients' interests above their own, and who are always quick to recognize and encourage those of their colleagues whom they think are especially qualified and equipped to do the best work for their patients, when needed.

But year after year changes have been going on, until now we hear it said that, "Today is virtually the day of the specialist." The good old family doctor, as we knew him a quarter of a century ago, is rapidly becoming a memory of yesterday. His place has already been taken by the keen internist, who, knowing his own work well, is most appreciative of that of others who may be laboring along different lines.

I believe this era of specialism gives evidence of the advancement and betterment of the whole profession; that it means far more efficient service rendered to the public than it has received in the past.

In every specialty of medicine and surgery, earnest workers, delving ever deeper, are constantly adding to an already voluminous literature, so that it now has become almost impossible for a single individual to read it all, much less digest it. It now requires a close and almost undivided attention to that subject alone if one wishes to keep abreast with what is being accomplished in any special line of work.

With more knowledge and longer experience there comes to the specialist—if inspired by a true professional spirit—a better realization of the close relationship existing between his particular field and all the other parts of the body. He perceives that his labors form but a small part in the general scheme of medical practice; that it takes all the parts to make up the whole. Further, he learns that he is not exempt from the laws of compensation, so that, while from devoting his entire attention thereto he excels in his own special work, he consequently lacks knowledge, experience and adeptness in that of others. As a result, lately among progressive men, there has arisen a movement to form what is known as "Diagnostic Groups." By this plan a patient, perhaps one referred by somebody without the group, is given a complete and most thorough examination by each one of a group of consultants who are all presumably expert in their particular lines of practice. After the examinations are entirely completed, the findings are discussed by the assembled group and a final diagnosis arrived at, if possible. This form of procedure brings out the best efforts of the consult-

ants. Each one examines the patient from a different angle, and later has the opportunity of learning from the discussions the relation of his findings to, and their value in, the ultimate diagnosis.

Group diagnosis has been hailed as a new idea. It may appear so to those practitioners who have not kept in close touch with affairs medical during the past decade. It may so seem to members of hospital staffs who have slumbered while the great changes in medical practice have been taking place. It may be so welcomed by some of those men in the university medical schools, who have eagerly taken up the movement and then have appropriated to themselves the credit for having originated it.

As a matter of fact it is the postgraduate medical schools and clinics of this country who really should receive the laurels. For many years they have made use of a plan of group diagnosis, in a modified form, but attaining the same ends. Being strangers to conservatism, they always have been the first to establish departments for teaching any special branch of the healing art which modern medicine demanded. Being the only institutions possessing a staff of clinicians in every specialty of medicine and surgery, patients seeking treatment at their clinics could always be, and were, referred from one department to another for special examinations. Therefore, I repeat, it was in the postgraduate schools and clinics that the plan of group diagnosis germinated. The present movement is simply an elaboration and an extension of the original idea.

Every diagnostic group should include specialists in every branch of medicine and surgery. Let us consider the advisability of including an enteroproctologist, in which matter we are particularly interested. It seems strange that a diagnostic group should pretend to offer the last word in a diagnosis, when the proctosigmoidoscopic examination—granting for the sake of argument that one was made—was done by someone who was without the training and experience sufficient to warrant the interpretation of his findings being considered of any value. It is this alone which counts: the mere instrumental examination means nothing.

There is some difficulty in understanding just why hospitals and colleges, which endeavor apparently to keep abreast of the times, as evidenced by the diagnostic groups which they have organized, do not aim to add to their staff a well-qualified enteroproctologist. Perhaps it may be owing to the objections of their surgeons, who, I regret to have to say, as a general rule have always been strenuously opposed to their field being further subdivided. But can they not see that, notwithstanding their protests, the eye, ear, nose, and throat surgeon, the orthopedic surgeon, the genito-urinary surgeon, and the gynecologist, among others, have steadily come into their own. Perhaps it is because those in the group desire to keep

their number as limited as possible, so as to make their financial returns proportionately larger. This I can hardly believe, as they are, for the most part—at least in the community in which I practice—men who are actuated by high professional and moral ideals, who aim to attain the utmost efficiency in their work, and who have always foremost in their minds the best interests of their patients.

As I have said before, the more adept one becomes in his specialty the more does he realize the very close relations existing between the parts in which he is particularly interested and the balance of the body in general, and special parts in particular. With longer experience more and more is this brought home to him; and so more and more does he find a need for the aid and co-operation of men expert along other lines.

The fellows of this society, at our annual meetings, and at meetings of county and state societies, have repeatedly urged the value of, and the necessity for this co-operation. They have again and again pointed out that anal, rectal, and colonic lesions often give rise reflexly to symptoms which may be wrongly attributed to disease in other parts of the body, and vice versa. They have shown this to be especially true with regard to the reproductive and urinary organs of the male and female. Therefore we claim that, in the consideration of cases presenting symptoms in these parts, it is equally important to secure the opinions of the gynecologist, urologist, and proctologist before a correct and final diagnosis can be deduced.

On several occasions Gant and others have called attention to the important fact that a roentgenogram of the colon and rectum often gives the picture of an apparently serious condition, whereas a proctosigmoidoscopic examination shows the fallacy of the same. Within the past two years I have myself seen three cases where the sigmoidoscope cleared away the fears which the pictures had aroused. All this goes also to accentuate the need for an entero-proctologist in a diagnostic group.

Though there are many others, I will speak of but one more class of cases, such as we commonly meet with, where the services of the proctologist can be of great assistance in making a diagnosis. I refer to that symptom-group, constipation and its sequelae. By proctosigmoidoscopic examination an intestinal stasis often will be found even though there is a history of regular daily bowel movements. As for the sequelae, many apparently come solely within the domain of the internist, gynecologist, urologist, orthopedist, neurologist, dermatologist, or other of the specialists, so that, to those who have given the matter but little thought, it may appear rather ridiculous that the claim is made that a rectocolonic examination may be of such importance in making or clearing up a diagnosis. But it is the highclass men among the specialists just men-

tioned who best know the value of, and mostly insist upon the need for, these examinations. For example, it was Reginald H. Sayre, of New York, at the 1916 meeting of the section on Orthopedic Surgery of the American Medical Association, who brought out, in the discussion of a paper on "Sciatica," that all the previous speakers had mentioned having gone over almost all other parts of the body in their search for the cause of pain in the sciatic nerve, but no one had spoken of the necessity for looking for fissures of the anus, growths in the rectum, or a dilated and filled colon.

It was at the same meeting, in the Section on Genito-Urinary Diseases, during the discussion of a paper on "Retention of Urine," that Edward L. Keyes, Jr., also of New York, reminded his audience that sometimes the relief of a fissure of the anus, or of a linear stricture of the rectum, may be the only means of relieving the main symptoms of bladder irritation. In illustration, he told how the General Service in Bellevue Hospital had sent him a case where the rectum was pronounced normal, but he had found a linear stricture, which was then incised, with a resultant cure of his patient's bladder trouble.

It is men of this type who best understand that through long and varied experience, skill in the use of the illuminated pneumatic sigmoidoscope, and ability to correctly interpret what is seen, the enteroproctologist is the one who should be relied upon to do this part in the diagnostic scheme.

The time has already arrived when even the laity recognize this, and they are now quick to take cognizance of the neglect of their medical adviser to secure for them an expert examination of the rectum and colon.

The American Proctologic Society has ever kept abreast with the progress made in medicine and surgery. From its ranks, through the labors of Tuttle, Gant, Mathews, Earle, Lynch, Hirschman, and Cooke, the medical profession has received its best text books on rectal and colonic diseases. These works, together with a wealth of literature contributed by the fellows of the society during the past eighteen years, have gone far in educating the whole profession to recognize and treat a class of cases which before was neglected and often mistreated.

The specialty of enteroproctology, having done so much, should in turn share the fruit of its labors. Every diagnostic group should include a competent proctologist. Only then will it be worthy of the name of "Diagnostic Group."

ADULT RECTAL PROLAPSE—TWO CASES AND A CONTRAST.*

By RALPH W. JACKSON, M.D., F.A.C.S., Fall River, Mass.

One finds on reviewing the transactions of this society since first published in 1908, the preceding programs not being available, practically only one paper touching at length on the major types of rectal prolapse in adults. This is surely not so infrequent a pathological condition that it deserves no more consideration at our hands; and, even if that were true, it is sufficiently rebellious to treatment, when it does occur, to make up in interest for any lack of frequency. It has had greater attention in recent years from men not professing to be proctologists.

Numerous works on rectal disease, a half dozen of them by present or past members of our society, and other medical literature propose a bewildering array of anal narrowings and wirings, rectal amputations, plications and pexies, infra-pelvic and supra-pelvic, for the cure of prolapse. Often the writer is unsatisfyingly vague and non-committal as to what he himself considers the best therapy, to say nothing of his non-coincidence with other authorities. The experience and studies of proctologists ought to go farther than that of others in giving us a generally acceptable line of attack on this very troublesome disorder.

In this belief, I hope not with limited experience to settle mooted points, but rather to arouse in discussion enough comment and criticism, adverse or otherwise, from those of greater experience, to go some way toward the desired goal. Two sharply contrasting cases, in some detail, will serve to bring out the points and the reasons for certain views that will be stated in conclusion.

CASE I.

First seen June, 1914, Mrs. S. L., housekeeper and mill operative, was a fairly well developed woman, had had very little general sickness, but two confinements which she said were normal, and one miscarriage, and catamenia O. K. No marked uterine displacement. Rectal trouble had been present only one year and was markedly progressive. Prolapse was constant when she was on her feet, and, when reduced, would only stay a short time. There was bleeding and slimy discharge and much aching and pain. Examination showed a prolapse as large as a good-sized orange, with the typical concentric rugae and surrounded by a sulcus at the anal margin, and the sphincters were so atrophied by the constant divulsion that they were not much in evidence. At once a very generous regional cauterization was done with the clamp, to contract the anus, and the patient kept in the dorsal position for some time.

*Read at the nineteenth annual meeting of the American Proctologic Society.

Very temporary relief was obtained, and in October I did the Tuttle operation through a retro-anal incision, freeing the rectum from the sacral hollow and, laterally, bringing it down through the incision, and plicating it with silk worm gut sutures which were then passed out around the sacrum and tied, i. e., a sacral suspension. The results of this procedure were scarcely more satisfactory, and early recurrence differed only from the previous prolapse in that the posterior wall was better supported, and in December I amputated the whole protrusion. This operation was done without incident except opening the peritoneal cul de sac. This was not closed, but, after all the sutures were placed, was drained anteriorly by one wick for forty-eight hours. After a week of absolute tying up of the bowels, the whole healed with as near primary union as is ever possible to get in this locality. The redundant gut had been removed, the anus was distinctly narrowed, the sphincters rebounded well and she had no further rectal prolapse. But the cul de sac was not obliterated and the contained coils of intestine promptly turned forward and produced a perfectly enormous hernia of the posterior vaginal wall through the vulva. Finally in July, 1916, I opened the abdomen, and by the Moschowitz method of successive circular sutures closed the sac and thus excluded the intestine. Further the longitudinal band of the sigmoid was sewn to the posterior aspect of the uterus and a ventro-fixation done, a valuable additional safeguard against return of the trouble. Her condition is now of entire relief which she cannot enjoy to the utmost, because of the work which her circumstances forced upon her. A rather long story and how different from the next.

CASE II.

First seen May, 1916, Mrs. H. T., housekeeper, was a thin, stooped, semi-decrepit woman as the result of a lifetime of hard work, had had eight confinements, and menopause when 38 to 40 years old. Some downward displacement of uterus. Had bleeding piles at times for years, and present persistent and progressive prolapse for nine or ten months, which was reducible but would not stay at all. There was not much bleeding, but pain and fecal incontinence. Examination showed a prolapse about the size and appearance of the other case except there was not the sulcus at the anal margin, and the sphincters were atrophied beyond the point of recognition. The ischiorectal fossae were almost devoid of fat, and the levators flabby and inadequate, all to correspond with the general emaciation and muscular degeneration. She was a woman actually much older than her years, and a more unfavorable subject could hardly have been found for the Moschowitz operation and suspension which I did on her ten days later. The relief was immediate to at least one, and that the most annoying of the poor old woman's infirmities, though its entire permanency may not be as certain because of the refusal of the sphincters to rebound, and the lack of perianal muscular and adipose support.

Here are two cases and of the first you will be tempted to say "That woman has had her share." Right, she has, and most of it might have been avoided, had I then been convinced as I am now, that the hernial theory, while not by any means explaining the whole etiology of major rectal prolapse, yet points the way toward the most rational treatment of it. But the woman is alive, cured and grateful, quite enough to disarm serious criticism. In sharp contrast with this is the second, cured by only one operation and

grateful, but more justifiably so, if she only knew it, because of having reached the same goal with so much less effort.

The competency of the pelvic floor as a support for the overlying viscera would seem to depend on the sufficiency of four factors. 1. The pelvic fascia. 2. The levator ani muscle. 3. The muscular and fibrous elements, guarding the openings through the two foregoing structures. 4. The fat beneath and around the three foregoing structures.

The pelvic fascia is differently described by different writers, but we may weed out some fairly indisputable facts. It is continuous from the pelvic brim with the fascia elsewhere sublying the peritoneum. It is not an unbroken structure, but distinct prolongations invest and form the chief supports of the bladder, uterine cervix and rectum. The point of its rectal attachment is an inconstant one, thereby varying the normal depth of the cul de sac. It is subject, like the structures beneath, to atrophic changes, dependent upon trauma and general health conditions, with consequent relaxation and abnormal depth of the sac. Furthermore, while usually a structure of much strength, it may be almost non-existent congenitally and thereby be a potential cause of trouble.

Beneath the fascia at an appreciable distance are the levators, voluntary muscles of great importance, anteriorly converging from the arcus tendineus on either side to a mid-line union behind the rectum and probably the vagina, and by their contraction not only lifting the pelvic floor, but closing the rectum and vagina through approximation of their walls. The value of this approximation is considerable for the anus, but greater for the vagina, since, in the erect position, that is the most dependent part of the pelvis whither all the contents tend to gravitate.

This pelvic diaphragm of fascia and muscle would be a perfect enough support, were it not rendered defective by the openings which nature demands for excretion and reproduction. The anal and vaginal orifices are guarded by the anal sphincters, the perivulvar muscular elements of somewhat similar function, an intact perineum, and the just mentioned levator action. Of the two the guarding of the anus is undoubtedly the more adequate and is favored by the fact that, in the erect position, it is the less dependent part. But inadequacy of any of these structures, whether from trauma or disease, spells descensus of some of the organs above. Rectal and vaginal prolapse are related in cause and often coincident. From the evident greater possibility of injury to the pelvic floor in females, one naturally and rightly infers that prolapse per anum is more common in that sex.

Not enough stress has been laid on the fact that this floor itself normally has and needs support. A plentiful supply of fat in the meshes of the connective tissue of the ischiorectal fossae forms a

cushion for its support, and compresses and supports the anal canal. A deficiency of fat favors sagging of the diaphragm and relaxation of the anal canal. Of this last no better proof need be given than the much better anal control which one gets in the stout muscular patient than in the thin emaciated one, where the sphincters have been much incised necessarily to cure fistula. Restoration of lost fat, as well as of muscular tone, aids the cure and prevention of recurrence of a rectal prolapse.

Above the pelvic floor the rectum emerges a soft-walled, distensible and rather mobile viscus, and most poorly supported considering the resistance it must constantly offer to the downward pressure, internally of its fecal contents, and externally, and more important, of the too often ptotic intestines in the peritoneal cul de sac. Posteriorly the attachment of the rectum is imperfect to the sacral hollow, laterally consists only of loose cellular tissue, and anteriorly is nil and this is usually fully half the circumference of the organ. Right here is nature's weak point and the weakness increases the lower the point of the peritoneal reflection, *i. e.*, the deeper the sac.

Cases of major rectal prolapse may begin from this point as a hernia into the rectum, gradually dragging in the lateral and then the posterior walls, and finally protruding through the anus; or may begin as a protrusion of the anal mucosa, gradually dragging down all the coats till they appear through the anus; but eventually there will be found in the anterior part of the protrusion the same peritoneal sac and contents in the latter as in the former incidence. The complete obliteration of this sac and exclusion of the contained intestine is a most important factor in the cure of the disease.

The first operation on Case I, extensive regional cauterization, though superior to any linear burning, may be dismissed briefly. It was too puny a procedure to be efficient against so great a prolapse, and was even contraindicated because, as shown by the marginal sulcus, this case did not begin as an anal prolapse, but was primarily a hernial intussusception from above. The operation ought not to have been attempted.

The second operation in Case I, sacral fixation, failed for the same reason that Jones assigned in his recent admirable paper (*Bost. Med. and Surg. Journal*, Nov. 2, 1916). The relapses that followed the posterior recto-pexies of himself and others had led him to believe that in most cases it is an ill conceived operation. Theoretically it depends on suspension of the rectum to the sacrum and on the cicatricial adhesions which are to form wherever the viscus has been separated from the adjacent structure. But it only reinforces the supports which need it least, and does nothing for that portion of the rectum which has no support at all, *viz.*, the anterior wall. Still less likely to succeed in cases of any size is

the method where no peri-sacral sutures are used, but entire dependence placed on packing, wound granulation and adhesions. Though Mummery (*Dis. of Rectum and Anus*, p. 122) claims much for this, I am certain that most operators do not attain the same success.

The third operation on Case I, amputation of the protrusion, need not be, with proper technic, the formidable procedure described by many with such terrors of hemorrhage and peritoneal sepsis. The encircling tape suggested by Lynch (*Dis. of Rectum and Colon*, p. 272) materially lessens the former. In regard to the latter, it is almost inevitable that the peritoneal pouch will be opened, and I do not believe that it should be closed absolutely, but rather that it should be temporarily drained, and that the danger will be less in that way because of the impossibility of perfect sterilization for any operation in this field. The results so far as the descensus through the anus were admirable in Case I, but the peritoneal pouch was still left as low at least as the perineal body, and the contained bowel, finding its previous line of least resistance barred to it, took the next course, and pushed its way through the birth canal fault in the pelvic floor. From such a sequence as this, of course, the other sex would be immune.

The fourth operation on Case I, obliteration of the peritoneal pouch, promptly put an end to the vaginal hernia, because it closed the hernial sac, which it would have done before when that sac was an anal and not a vaginal protrusion, and which it did do in the one operation in Case 2. While similar ideas of the surgical therapy of rectal prolapse had been advanced by German and French writers, it remained for Moschowitz to publish (*Sur., Gyn. & Obs.*, July, 1912) such a logical and convincingly argued and illustrated article as none too often appears in medical print. The operation is often extremely difficult. The cul de sac in any patient is deep enough to make work at the bottom of it hard; but when it has extended for years as a hernial sac through the rectum to or beyond the perineum, it has attained a depth much greater than normal, and makes the work more than proportionately more difficult. Special long instruments greatly facilitate it, and an exaggerated Trendelenberg position must be used to bring the fundus of the sac, the rectum, and the other pelvic contents as near as may be to the generous abdominal incision. The danger of damage to the ureters and pelvic vessels is considerable and not to be overlooked.

While the Moschowitz operation prevents the downward push of the intestines and fairly supports the anterior rectal wall, I do not believe it is ever superfluous to reinforce the support, while the abdomen is open, by every other possible means. To this end the sigmoids-utero-ventral wall pexy is the strongest line of sus-

pension that can be built up in a female. Since in males relapse cannot occur through a vagina but only through the anus, while there might not seem so much necessity of the additional support, it is still advisable and harmless to do some type of sigmoidopexy.

It was said that in Case II the prognosis was not as certain. If in that type of case there should be recurrence through the inability of the pelvic floor, because of stretching, atrophy or trauma of any or all its four factors of competency, to support what redundancy of the rectal wall the abdominal operations have not removed, then, what should be done? It rests between some form of plastic work, perineal, sphincteric, etc., or removal of the redundancy, *i. e.*, amputation. The plastic work is none too satisfactory on such weakened structures, and I believe would generally be less so than amputation, which operation would now be robbed any danger of peritoneal infection because of the previous closure of the cul de sac, and may be easily relieved of serious danger of hemorrhage. Then with all protrusion removed the sphincters and other muscles have their best chance to reassert themselves, and, failing to do so, may be repaired.

Such prolapses as we have been considering make life well nigh unbearable for the victim, whether male or female, and are comparable only to complete uterine prolapse. Only heroic surgery gives relief, and in summary I am inclined to assert that the operation of first choice for the major types of rectal prolapse in adults is cul de sac closure plus suspension, to be followed and supplemented, if need be, later by amputation and perhaps some plastic work on the elements of the pelvic floor.

PELLAGRA—THE PELLAGROUS INTESTINE AND PERI-COLIC VEILS.*

By JOHN L. JELKS, M.D., F.A.C.S., Memphis, Tenn.

It has been my privilege to see several hundred pellagrins and to view and study the gross gut-pathology in many of them (both antemortem and postmortem) and, owing to the rarity of similar records or reports, I have been prompted to devote my paper to this subject.

Pellagra has been discussed by able men for years, though few indeed have believed I could be correct in my contention of its infectious nature. However, I am hopeful in the reports coming from quite a number of observers during the last year, and am especially pleased with the work that has been done by some commissions with which and with whose personnel you are as familiar as myself.

Retrospection requires me to refer to my work and my enthusiasm back in 1909 and 1910, at which time I brought to you some reports which interested you for a time.

It was reasonable for me then to express as I did the belief as to the rôle the ameba played as a possible etiologic factor. As a matter of fact, I had been reporting cases of skin manifestation of amebiasis for three or four years previously, and the first well defined and previously diagnosed pellagrin I had brought to me, was also found to be an amebic case, and the skin symptoms seen in this were those I had been reporting as the skin manifestations of amebiasis. The gut-pathology was, of course, the same, the symbiotic bacillary and bacterial flora of the gut appeared the same, the melancholia and anemia were the same. I am today quite often confronted with cases of *ameba hystolytica* infection of the gut with its characteristic gut-pathology and at the same time with all of the later skin, nervous and other manifestations of pellagra.

In 1910 I also referred to certain associated bacilli which were in one case observed being harbored by the ameba. This case was referred to in my chapter on dysentery in Hirschman's book and may prove to be a very fortunate loophole for me in the future.

My persistent insistence on the infectious nature of pellagra has brought upon me the most scathing criticisms and denunciations from some sources, but far be it from me to surrender the contention, which I repeat on this and every available occasion, that

*Read at the nineteenth annual meeting of the American Proctologic Society.

pellagra is an infectious disease, with tendency to chronicity, exhibiting its primary pathology in the intestine in a similar manner to typhoid fever, and that the greater degree of pathology is found in the rectum, colon, cecum, and appendix.

There is a prodromal stage, and the early symptoms which I have observed are similar to those of typhoid fever. There is general malaise, weakness, sleeplessness, anorexia, and tenderness of the abdominal viscera. Intestinal symptoms more or less marked appear, which may or may not be ushered in with symptoms not unlike those of cholera morbus. The tongue becomes quite pointed and red in some cases, the patient complains of pain in the back of the neck and head. The patient usually begins, in this stage, to lose weight rapidly, and this loss of weight may in time equal or exceed the loss in typhoid, as in a case recently operated on who had lost 134 pounds in 3 years: this man was having from 20 to 30 bowel movements every 24 hours. During this stage there will be found marked indicanuria and possibly bacilluria. There is at this time to be found a decided thermic range, from $96\frac{1}{2}^{\circ}$ to 97° in the early morning hours to $99\frac{1}{2}^{\circ}$ to 101° in the evening.

The pain elicited by pressure upon the cervical and dorsal nerve roots, the temperature curve, the urinary indican, and the bowel disturbances have appeared to be in direct ratio with or dependable on the amount of pathology which may be demonstrated in the gut. This pathology as previously referred to is not unlike that of amebic infection, except that, as a rule, the erosions appear more superficial. The hyperemia is general, and the oozing is from every surface as if the vasoconstrictors were paralyzed, and the blood is oozing from every capillary. Now, while this is the rule, there are marked exceptions; in fact in some cases the pathology in the rectum and sigmoid is very extensive, as extensive in fact as I have observed in any amebic case. The conditions found in some cases must need be remittent or intermittent in their severity, or these patients would rapidly become exsanguinated or septic or both, as in fact some do. But these remissions occur apparently regardless of treatment other than rest, the elimination of carbohydrate foods and the substituting therefor a diet of milk and eggs, which does not supply in the gut laboratory a good culture media in these cases. Under such a regime the hemorrhage ceases, the diarrheal symptoms abate, and even constipation supervenes. The intestinal mucosa then assumes a pink or red and glazed appearance, and for a time thereafter may appear quite normal, until the next seasonal recurrence, when the same unhappy course ensues.

When these cases become serious or chronic, there may be observed an acidosis, and in every case a very marked diminution in the amount of gastric acid, in fact the entire gastrointestinal glandular secretory system seems to suffer serious atony.

If the rectum and sigmoid is examined from time to time, during and between recurrent attacks of pellagra, the conditions will be found to vary between the two extremes previously alluded to, the pathology may be quite as extensive as ever observed in amebic cases, with extensive confluent and discreet ulcers, and later developments of adenomata, scars, and even stenosis.

After an apparent recovery, the gut may seem quite normal, and even blanched, owing to the low hemoglobin and to inanition, yet, with the recurrence of symptoms, the blush, the ooze, and the ulcerations recur, and this ooze appears from both mucous and serous surfaces. The cecum and appendix quite often suffers early and so seriously that operations for appendicitis are performed by the unsuspecting surgeon.

When adenomata or serious mixed infection ulcerations have occurred the diarrheal symptoms may persist between attacks. The oozing from the serous surfaces has been observed in some cases so extensive that a pint of free fluid was found in the peritoneum.

In some cases I have opened, I have found very extensive pericolic veils, which I have suspected were the result of this pericolitis, or organized transudate.

I wish not to be misunderstood or misquoted here, for I do not allude to such as the bloodless folds of Treves, which I believe are of a different origin and are productive of stasis, while the veils are more often associated with the so-called mucous colitis. These veils evidently constitute a late pathology in either the rectum or other parts of the large bowel.

I have performed appendicocoelectomy twice in the last two weeks in pellagrous cases. The first patient had extensive pathology in the gut similar to that found in amebiasis. He had had the condition several years, and lost 144 pounds in weight; he was from a pellagrous neighborhood. In his city there had been a lady who had been visiting in Los Angeles and was sent to me as a peculiar rectosigmoid case, which the doctor in Los Angeles wrote he did not understand. When I examined her I asked her some questions that are very pertinent. The first was, "Where are you from?" "Originally from West Tennessee," she replied. "Where have you been since then?" "In California and Texas." "Have there been any other members of your family with diarrhea and dysentery?" "Yes, my mother." "Where is she?" "In Texas." "Will you bring her to see me?" "Yes," she replied. The mother came, and I found that they both had the same gut condition, with indicanuria and bacilluria and other symptoms referred to in this address, as also the same microscopic and macroscopic pictures in the gut.

Now, gentlemen, in some respects this is similar to amebiasis,

only, in the majority of instances, the pathology is more superficial. The gut is coated with a serosanguinous mucus, beneath which are found superficial erosions, and circinate lines, and in my section where amebiasis is so common, I often find deeper and more extensive pathology. If the condition is acute you will find that there is an ooze from every surface of the gut. If there is a mixed infection, you will find pathology going down to and possibly including the musculosa; but if it is an acute one, you will find just the oozing and the superficial abrasion. When you examine a case thus, and find the picture which I have drawn, as was found in these two cases, both of which showed a great increase in the bacillary and bacterial flora of the gut, storms of bacilli in the urine, tenderness about the cervical and dorsal vertebrae on pressure over the points of exit of the nerves that supply the skin areas that become involved in trophic lesions later, do not wait for the skin lesions to occur, but pronounce your case then as pellagra, as I did these.

Pellagra seldom develops in a screened sanitary home or hospital. Sanitation, isolation, and elimination of raw vegetables as a diet, and effectual screening will in my humble opinion control pellagra. The negroes and poor whites in my country have this year more money, and more to eat, and a greater variety of diet than they ever had, yet pellagra is increasing rapidly.

I have treated for pellagra a wealthy merchant, a wealthy lumberman's wife, a doctor's wife, a doctor's mother, a doctor, a lawyer's wife and mother, a railroad man's wife, a farmer's wife, a nurse, a bookkeeper and a coal-dealer.

This disease is no respecter of person or station in society, though of course the poor, in their depravity, filth, and lowered resistance, many of whom use their back yard and garden for privy, are more liable to suffer from this, as they would from typhoid infection.

The disease is increasing only in the infected areas around Memphis, where sanitary conditions are not good, and seldom extends over the sewered and screened lines. A doctor nine miles south of Memphis had 60 cases last year, and has already 104 cases this year.

We have recently had an ordinance passed in Memphis requiring doctors to report cases of pellagra and the same precautionary measures are taken in these cases as in cases of typhoid fever.

INFLAMMATORY RECTOSIGMOIDAL STRICTURES HITHERTO UNDESCRIBED.*

By GRANVILLE S. HANES, M.D., Louisville, Ky.

I wish to briefly refer to a type of stricture which seems to have a predilection, as to site, for the juncture of the rectum and sigmoid, extending variable distances above and below this point. I am sure a number of authors have made reference to this peculiar character of stricture, but only in a most casual manner.

Lynch says in reference to strictures that "We have severe infections resulting in multiple polyposis." He continues by saying that he has followed some of these cases for five years without seeing a stricture result and that numerous instances of this kind might be mentioned showing that severe infections do not always result in fibrous contractions of the bowel. He further says that there must be some specific bacterium which comes into intimate contact with the cells and results in general fibrosis. I make the latter reference for the reason that the author's views coincide with my own as regards the specific action of bacteria in causing certain types of rectal strictures.

The type of stricture I have in mind is characterized by the following:

1. It always involves the rectosigmoidal juncture, extending to a greater or less distance above or below this point. I have observed eight cases of this type and all have extended well above and below this juncture except one, in which instance the stricture was almost entirely above the rectal juncture.

2. The wartlike eminences or excrescences that grow out from the surfaces of the strictures; these are very soft and friable; can be easily pulled away from their attachments with alligator or other forceps. They vary from one-fourth to one-half inch in length. There is rarely but little tendency to pedunculation. At their attachments the diameter approximates one-fourth inch. In numerous instances I have seen these growths in their early development. I have completely destroyed these growths tearing them away with forceps, burning them with the Paquelin or electric cauteries or by fulguration and, in every instance, except two, to which I will later refer, they returned or, at least, new ones formed. These growths did not occur at the upper or lower extremities of the stricture only, as mentioned by Van Buren, but they were found along the entire length of the stricture.

*Read at the nineteenth annual meeting of the American Proctologic Society.

3. The extraordinary tendency to bleed when subjected to any kind of manipulation. A sponge or cotton rubbed over the surface of the stricture will provoke profuse bleeding both from the surface of the excrescences and the intervening spaces. It is extraordinary that these patients do not complain of hemorrhages from the frequent actions of the bowels. There is, of course, some bleeding under those circumstances, but in no proportion to that produced by manipulation. The mucosa is decidedly granular and bleeds freely as just stated.

4. There is a characteristic grayish-white deposit, resembling diphtheritic membrane, all along the strictured surface. This deposit is composed of epithelial cells, leucocytes, mucus, bacteria, etc.

5. The patients all have an annoying diarrhea. The desire to go to stool is constant in advanced cases. Of course, this is due to the presence of the numerous growths, the inflammatory state of the bowel wall and the accumulation of mucus.

6. The strictured portion may involve 4 or 5 inches of the gut, or, as in a case who came under my observation three months ago, it may extend up into the sigmoid 8 to 10 inches. In one instance the tissues were involved down to the internal anal opening.

7. The thickened condition of the wall of the gut is quite uniform and is due to the increase, both in bulk and density, of the connective tissue elements in the walls of the bowel and also a thickening of submucous and intermuscular coats. While we are not able to isolate any definite organism and say this particular bacterium is the offending germ in this type of stricture, we can say that no other hypothesis offers equally reasonable arguments for a satisfactory solution. I feel fully convinced that there is a very definite type of germ life responsible for this very extraordinary pathological phenomenon and I greatly hope that the day is not far distant when many of these specific bacteria may be easily identified.

8. The local symptoms are constriction of the lumen of the bowel, numerous wart-like growths, accumulations of a moderate amount of mucous, leucocytes, bacteria, epithelial cells, etc., with but little microscopic blood except when the parts are subjected to manipulations. There is an annoying sensation present in the rectum which causes a constant desire to strain. Where the tenesmus is very great, large hemorrhoids are not infrequent complications. From the constant diarrhea present, pain, loss of sleep, interference with digestion, etc., the patients become thin, nervous, anemic, emaciated, and die from exhaustion.

I have done colostomies in 3 of the 8 cases to whom I have referred. One was moribund, while the other two were completely exhausted and exhibited pictures of advanced stages of cancer. In fact, one of the cases was looked upon by two of our leading

surgeons as being cancer of the rectum. This patient gradually improved after the colostomy was done and in several months regained his normal weight and state of health. The operation was done eight years ago, and, while we have not been able to close the artificial opening in the bowel, the patient has remained in most excellent health and good spirits.

The second case exhibited every evidence of cancerous degeneration at the time of operation. This patient improved gradually and within several months he had regained his normal state of health which he is now enjoying. The operation was done four years ago. I doubt that it will ever be possible to close either of these colostomies and reestablish the normal fecal current. I have examined these patients frequently and I have found that there is a great deal of narrowing of the intestinal lumen at the site of the old strictures. While the whole mucosa seems to be regenerated and comparatively normal in appearance, yet when rubbed rather harshly with gauze there is a tendency to slight bleeding. After the colostomies were done no treatment was directed to the diseased area of the bowel, except irrigations of the parts with normal saline or permanganate solution. The warty excrescences all disappeared; the active inflammatory process in the wall of the bowel immediately subsided. In the third patient the stricture was found almost entirely above the rectosigmoidal junction. A colostomy was attempted but, when the sigmoid was brought out through the abdominal wound, it was found that a second stricture, between 3 and 4 inches in length, was present at the junction of the iliac colon with the sigmoid. I then did a cecostomy and as there was no permanent improvement experienced the ileum near its lower extremity was divided and an ileostomy was done, making an opening in the median line an equal distance between the pubes and umbilicus. The patient's general condition has improved very much, but there is little change in the local conditions. I have in the remaining cases destroyed the small tumors by fulguration and have used various astringent and antiseptic applications. Three of these seem to be considerably improved; the remaining two will, undoubtedly, require colostomies.

The foregoing is a brief reference to this rare type of stricture which I hope to refer to more fully before this society in the future. In the meantime I feel sure there are others present who will give us the benefit of their observation upon this subject.

ADENOMYOMA OF THE RECTUM.*

By FRANK C. YEOMANS, M.D., F.A.C.S.,

Surgeon to the Central-Neurological and Workhouse Hospitals, Instructor in Surgery, College of Physicians and Surgeons, Columbia University, New York City.

While both the benign and the malignant growths of the bowel, originating in the mucosa, have long been observed and thoroughly studied, as yet comparatively few observations have been made upon tumors occurring in the muscular coats.

In 1910, Descourdes¹ cited from the literature 80 cases of myoma of the intestinal tract, sixteen of which were in the rectum. These tumors are either internal, projecting into the bowel lumen, or external, growing away from it. He reported only twelve of the external variety. They are very large and their diagnosis is difficult. In the case reported by Descoudres the tumor was the size of a cocoanut, presented at the buttock and made sitting difficult.

Last year Cullen² reported fifteen cases of adenomyoma of the rectovaginal septum. Of these 5 were his own, the remainder were distributed as follows: Stephens 5, Jessup 2, Lockyer 2, and Nadel 1. Recently Kellogg³ has reported a case occurring in his own practice.

Adenomyoma of the rectovaginal septum is a tumor described only comparatively recently, all the cases being reported since 1909. This is a neoplasm developing in the triangular space between the cervix uteri in front, the rectum behind and the peritoneum above. As the tumor grows it may extend upward, gluing the cervix to the rectum, backward into the rectum or laterally into the broad ligaments. An arbitrary classification of these tumors has been made, depending upon the direction of the extension of the growth. Naturally a tumor that belongs to one class this year may, by its growth, at a later date belong to another class.

My interest in adenomyomata is due to the following case which appears to be unique:

Mrs. V., born in France, aged 37 years, married and the mother of two healthy children, was referred to me in September, 1916, because of rectal hemorrhage and pain. Six years before she had "pulmonary tuberculosis which was cured in France." Menses are painful and the flow is gradually ceasing,—no leucorrhea. Prior to three years ago she was always constipated. Then she had an attack of diarrhea lasting five months. Thereafter intermittent attacks occurred and during the past year stools have averaged 10 to 12 daily, containing fresh blood and mucus. During the past three years patient had pain over lower sacrum, aggravated at the menstrual period and with the diarrhea.

*Read at the nineteenth annual meeting of the American Proctologic Society.

Physical Examination.—A rather pale but well nourished woman of 5 feet, 5 inches, weighing 142 pounds, which is her average. Hemoglobin 85 percent. Wassermann of the blood was negative. Urinalysis was normal. Chest and abdomen were negative.

Rectal Examination.—Three and one-half inches up on the anterior rectal wall, just above the cervix uteri, the finger feels a hard, fixed, fairly tender mass, the limits of which cannot be clearly defined and on which the overlying mucosa is not movable. The proctoscope shows a superficial ulceration the size of a quarter dollar at the rectosigmoidal juncture which is red and clean, and which bleeds freely on contact. Elsewhere the rectum and sigmoid were normal.

Vaginal Examination.—Uterus normal in size and position and movable. The lateral fornices were clear but, in the posterior fornix, was felt the same hard, tender, slightly movable mass, the size of a guinea hen's egg, as was felt per rectum.

Operation.—September 26, 1916. Gas and ether anesthesia. Trendelenburg position. Left rectus incision. The sigmoid flexure was very long, as indicated by the x-ray, and contained an excess of yellow fat in its mesentery. No growths were felt in the liver or other abdominal organs. The tumor was located in the anterior wall of the sigmoid just above its juncture with the rectum and extended downward two inches on to rectum, cervix uteri and posterior vaginal wall. Lower third of sigmoid was mobilized, including a small portion of the posterior wall of the uterus and its cervix, and the superior hemorrhoidal artery was ligated. Then the abdominal wound was closed and in the lithotomy position the operation was completed by a typical Genu-Tuttle extirpation of the rectum, including the posterior vaginal fornix, $1\frac{1}{2} \times 2$ inches, which was involved in the tumor. The sphincter ani was preserved and the sigmoid sewed to the peri-anal skin, thus forming the new rectum. About four ounces of blood were lost but shock was marked at the end of the operation. However, the patient responded promptly to one intravenous infusion. Bowels acted on the third day. Union of sigmoid and skin was primary except at one small space of one-half inch which soon granulated. Patient left the hospital three and one-half weeks after operation and is now well, having normal anal sensibility for bowel actions which now occur once or twice daily with normal control. Her weight is 146 pounds, a gain of 4 pounds since operation. Vaginal and rectal examinations show no abnormalities.

The points of interest in this and similar tumors in this location center in their origin, diagnosis, prognosis, and method of treatment.

Origin.—W. J. Mayo⁴ states that "As yet there has been no good explanation of the absence of myomas in the voluntary muscle and the frequency of these tumors in the involuntary muscle. The cause is undoubtedly connected with the primitive power of contraction of smooth muscle fibers and their ability to hypertrophy quickly in response to demand. In this connection it is well to remember that the round, broad, ovarian, and uterosacral ligaments contain smooth muscle derived from the uterine wall and that myomas and adenomyomas (Cullen) may occur in these locations." The origin of adenomyomas is not always clear. Cullen and Jessup, on the basis of histologic study, conclude that in most cases they originate from the uterine mucosa which with the smooth muscle

has an inherent tendency to invade adjacent structures. Jessup⁵ says, "The epithelial cells lining the glands are cylindrical and cilia can be demonstrated on the surface of some." Such findings would be conclusive proof of the source of the particular tumor in question. Lockyer⁶ suggests that these tumors arise from the remains of Wolffian ducts. Stevens⁷ says that some cases reveal no connection with the uterine mucosa and "consequently their origin cannot be ascertained." Some cases at least seem to be true neoplasms, developing from embryonic rests persisting from the fusion of Müller's ducts.

In my own case the tumor clinically was essentially an intestinal growth. No other tumor like it has been described so far as I can learn. Grossly the tumor was incorporated in the intestinal wall and the main direction of the growth was toward the bowel lumen, where it caused a pressure necrosis of the mucosa over an area the size of a quarter. After careful study of the gross tumor and microscopic sections, Dr. James Ewing reports: "Your intestinal tumor is an adenomyoma and its close incorporation in the muscle coat of the rectum indicates that it belongs originally with this portion of muscle tissue. The most likely origin is from superfluous material derived from that portion of the lower gut which continues on in the embryo to the bladder and allantois, and which normally atrophies. Persistence of a portion of this segment would furnish a source of smooth muscle and intestinal epithelium. I do not think the tumor is of Müllerian origin."

Symptoms.—Naturally this variety of tumor might be latent for years. Later, varying with the stage of development and location of the growth, the symptoms would be:

1. Obstructive, when the bowel lumen is encroached upon.
2. Dysenteric—frequent stools containing blood—when pressure necrosis of the mucosa has occurred, or
3. Neuralgic—when sensitive nerves are compressed—evidenced especially by sacral and rectal pain.

Diagnosis.—Unless the examiner were on his guard, as a result of previous experience, it is doubtful if he would even consider adenomyoma. Certain tumors, notably adenocarcinoma and polyps, impart a characteristic feel to the examining finger. To recognize them promptly, however, one must have felt them many times. Likewise rectal adenomyoma has a peculiar feel which the examiner would not be apt to forget. Both of the cases of adenomyoma of the recto-vaginal septum reported by Jessup had been pronounced inoperable "on account of the apparent involvement of the rectum by a malignant growth."

If sarcoma occurred in the rectum one would think of it. The so-called "rectal shelf" described by Bloomer and by English writers, an implantation of a carcinoma in Douglas' sac, would be another possibility, to be recognized, however, by discovery of the primary

growth elsewhere in the abdomen. In my case the sensation was that of an infiltrating malignant growth.

Prognosis.—Histologically adenomyoma is a benign tumor. Yet clinically, as in my case, it may become malignant from the severe symptoms—pain, bleeding, etc., to which its extension gives rise. Moreover, actual malignant transformation may occur.

Treatment.—Surgical removal is the only curative therapy. The practical question is how it may be best accomplished. In view of the progressive nature of these growths, the longer their removal is postponed the more difficult it becomes. Early removal would, therefore, seem to be the procedure indicated, both to subject the patient to the least surgical risk and as a prophylaxis against malignancy. Of tumors of the colon, those at the recto-sigmoidal juncture are, from the standpoint of technique, most difficult for successful removal. Unless contraindicated by old age, marked debility or obesity, I believe that approach should always be made through the abdomen. Thus only can the extent of the growth be defined and metastases be recognized. In some cases the operation can be completed through the abdominal incision. If, however, a considerable portion of bowel must be sacrificed, the danger of infection, peritonitis and fecal fistula are very grave. In such instances it is far safer if the sigmoid is sufficiently long to mobilize the portion of bowel containing the tumor, close the abdomen and complete the operation by the perineal route, doing a Genu-Tuttle or similar extirpation of the rectum, preserving the sphincter ani and forming a new rectum from the sigmoid which is sewed to the anal margin.

The fact that the number of cases of adenomyoma of the rectovaginal septum reported in recent years is comparatively large, and the discovery of my own case of adenomyoma of the rectum proper, makes it a fair inference that many others have been missed or wrongly diagnosed, either because the diagnosis has been made upon the gross appearance or because the tumor has not been submitted to a careful and thorough microscopic examination, as Cullen found in a review of some of his specimens. We owe it to our patients to have every tumor removed thoroughly studied by a competent pathologist, as the precise nature of the growth is full of significance for the ultimate prognosis.

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SHOULD THE SPHINCTER MUSCLES BE DIVIDED?*

By ROLLIN H. BARNES, M.D., Editor of The Proctologist and Gastroenterologist, St. Louis, Mo.

It is with hesitation that I enter upon the discussion of this subject, on account of the difficulty of demonstrating principles that are practical, because the subject has so many different phases and requires the consideration of so many conditions. It is only with a realization of its importance to the patient as well as the proctologist that induces me to attempt it.

The subject was discussed extensively during the early part of the last century by such men as Brodie, Pott, and Syme. They seemed to establish the necessity of dividing the sphincters. Since then there have been many changes in surgical principles. One of the reasons given for the failure of fistulous tracts to heal was the mobility of the sphincters. We do not lay so much stress upon this today, but are rather inclined to believe that it is inadequate drainage, possibly continual reinfection, from the bowel.

In order that we may establish drainage so that these tracts will heal requires a most thorough knowledge of the anatomy of the parts, considerable skill in diagnosing the condition present and good judgment in placing our incisions so that they will produce adequate drainage. If the incisions are properly placed it is surprising how rapidly these wounds heal.

In 1913, I presented before this society at Minneapolis a paper outlining the principles involved in obtaining drainage without dividing these muscles. Since that time I have become more enthused in its success and have not divided a sphincter muscle since in the treatment of fistula in ano. In carrying out these principles one must ever keep in mind that the subject is drainage and that we are treating a chronic abscess.

If we are certain that the sphincters are not involved it is a simple matter to lay open the skin overlying the tract in order that drainage may be obtained. Under these conditions the direction of the incision is of little importance except that we aim to have resulting as little scar tissue as possible. This means that we should make clean incisions, remembering surgical principles in these regards as taught today.

When the sphincters are involved the direction of our incision is of more importance. The incision ordinarily should be in the

*Dr. Barnes died in the New York Polyclinic Hospital, of acute appendicitis, the morning before this paper was to have been read at the nineteenth annual meeting of the American Proctologic Society.

direction of the muscle fibers rather than in the direction of the "spoke of a wheel" to the anus. The incision should be made so that it freely opens the skin over the abscess so that there will be no obstruction to drainage.

With the assistance of Dr. Daniel M. Schoemaker, anatomist at St. Louis University, in a study of the anatomy of the ischiorectal space and from clinical observation, I am satisfied that an infection located in any part of these spaces can be drained by direct incision through the skin.

By the use of the submucous dissection as indicated in my former paper you will be able to drain from the inside of the sphincters. Should you have any trouble with drainage during after-treatment, under local anesthesia, when it becomes necessary, you can extend your opening completely around the sphincter without dividing it. You may argue that exposure of the muscle will lead to adhesions, but these can be overcome by massage better than the condition resulting from dividing of the muscle. It is important not to destroy the muscular framework that goes to make the contour of the parts.

I desire to show a photo of an anus four years after operation for a double ischiorectal abscess with a submucous tract on the right side, extending above the sphincters, and the internal opening in the posterior commissure. I ask you to compare it with a picture from one of our latest books on rectal diseases.

When I presented my paper at Minneapolis, the question was raised as to how I would deal with a case in which the internal opening was located above the sphincter. At that time I had not had sufficient experience to have a definite idea of such a condition and today I have not seen such an opening except where it was made artificially. If you will carefully observe the anatomy of these parts you will find that the muscles are so arranged that they protect the bowel from such an opening except that it be from a submucous tract. When the opening is in the ischiorectal space and it opens into the bowel it follows the levator and muscle down to between the sphincters where it finds a weakened place into the anus. When the abscess is in the superior pelvi-rectal space it follows down above the levator ani muscle and finds a weakened place between the sphincters. I have seen this occur where there was no involvement of the ischiorectal space. You will be able to follow up such an opening and drain the superior space without going through the ischiorectal space. The muscular coat of the bowel-wall protects such an opening from an abscess of these spaces into the bowel.

I want to especially call your attention to the danger of making an artificial opening into the bowel when the superior space is involved. When you introduce your probe through the ischiorectal

space into a tract leading to the superior space you will find that it comes into contact with the bowel wall almost at right angle because of the bulging of the bowel immediately above the sphincters.

I find the most difficult portion of this region in which to obtain drainage without injury to muscles is that of the perineum. I account for this from the fact that we find muscles centering from so many directions. This makes it difficult to obtain drainage without obstruction from the muscles.

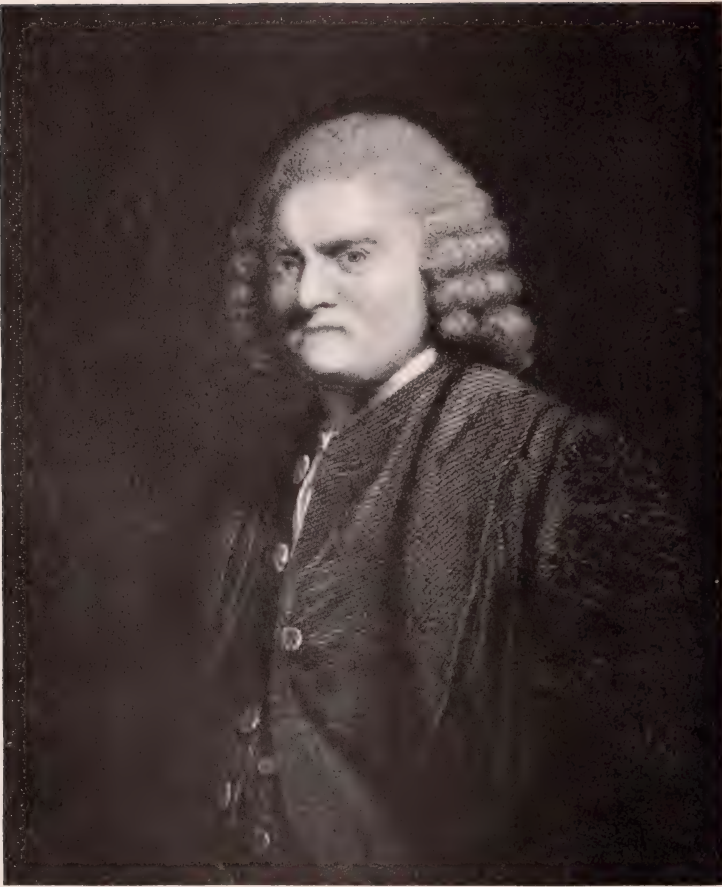
We have had considerable discussion with regards to packing these wounds. Formerly I believed that there was only one condition in which packing was justifiable, the control of hemorrhage. Now I believe different. You all have had cases in which you found that your incisions were apparently insufficient to obtain drainage and for some anatomical reason hesitated to extend them further. I have found in such cases by packing your wound tightly for 24 hours you will produce considerable separation of the wound and that you will have a better opening for drainage. This pack should not be continued for longer than 24 hours because it blocks drainage. In the after-treatment there may be times when this packing can be used to advantage. Especially will you find this pack of advantage in tracts of the perineum.

There is considerable difference in cases in the arrangement of the sphincter muscle. In my operative work I have noticed a number of cases in which the tract passes down to the levator ani muscle and then apparently leads forward almost to the skin margin where it opens into the anus. The drawing illustrates such a case. Notice the separation in this cross section of the internal and external sphincters.

I do not believe that anyone will question the advantage of obtaining a cure of fistula in ano, if possible, without dividing the sphincter muscles. We may hear all the arguments with regard to little danger of incontinence, but who will not admit that when the sphincters are once divided they do not have the same contractibility on account of the scar tissue.

Not only do we have the advantage of lessening of the danger of incontinence by this method, but we find less deformity than when the muscular structure is divided.

Rosenbloom: 'Sir John Pringle, M.D., F.R.S.



Sir JOHN PRINGLE, Bart., M.D., F.R.S.

Taken from a painting by Sir Joshua Reynolds belonging to the Royal Society.

SIR JOHN PRINGLE, M.D., F.R.S.

Founder of Modern Military Medicine and Originator of the Red Cross Idea.

BY JACOB ROSENBLOOM, M.D., Ph.D., Pittsburgh, Pa.

At this time, with its great interest in military medicine and the Red Cross work, it seems very opportune to recall the memory of a man who has done so much for both. This remarkable man was born in Scotland on the 10th of April, 1707. He was educated under a private tutor, at the University of St. Andrews, then went to Edinburgh for one year and took his degree of M. D. at Leyden in 1730, his dissertation being "De Marcore Senili." This was dedicated to his relatives, Dr. Francis Pringle, President of the College of Physicians, Edinburgh, and to Mr. Francis Pringle, Professor of Greek.

Mr. James Boswell, the biographer of Dr. Samuel Johnson, who was a close friend of John Pringle, says that the latter went to Amsterdam for a business career, but being at Leyden, he accidentally heard a lecture on medicine by the celebrated Professor Boerhaave, which so interested him that he decided to study medicine. At Leyden he was a close friend of Gerard Van Swieten. He further studied at Paris and returned to Edinburgh to practice as a physician. In 1734 he was appointed joint Professor of Pneumatics and Moral Philosophy, and annually delivered lectures on the immortality and immateriality of the soul. In 1742 he was put in charge of the Military Hospital with the British Army in Flanders, receiving twenty shillings a day while in service and half pay during his life. It was during this time that the Red Cross idea was originated by Pringle. It was customary, upon the approach of the enemy, to remove the sick from the camp, so that many soldiers were lost. The Earl of Stair in charge of the British Army, at Pringle's suggestion, proposed to the Duke de Noailles, the opposing commander, that the hospitals on both sides should be mutually protected. This was agreed to by both sides.

On account of his good work in Flanders, he was appointed, in 1745, Physician General to His Majesty's forces in the Low Countries and the parts beyond the seas; and Physician to the Royal Hospitals in the same countries. He served abroad till the conclusion of the treaty of Aix-la-Chapelle, when he then moved to

London. This was in 1749, and in 1758 he became a licentiate of the Royal College of Physicians.

He wrote on many subjects. In 1742,¹ he published a paper on "Vitrum Antimonii Ceratum, a specific medicine in the Dysentery." During the years 1750-52, he presented to the Royal Society, to which he had been elected a Fellow, seven papers containing the "Account of Experiments on Substances Resisting Putrefaction."² For these papers he was awarded the Copley medal by the Royal Society.

In 1752, the first edition of his work, "Observations on the Diseases of the Army" appeared. It has gone through many editions, the last of which appeared in 1810 and was translated into French, German and Italian. This work presented for the first time the true principles of military sanitation, especially as regard the ventilation of hospital wards. He showed that jail fever and hospital fever are the same and discovered the use of ammonia as an antiseptic where "manifest signs of putrefaction" had appeared. In the above work he tried to trace the causes of military diseases as dependent upon conditions of the air, diet, etc. He considered the effects upon the health of the troops of short or long campaigns and the period of the year at which they were undertaken. The work describes of the diseases from which the British troops, suffered and deals with the endemic diseases of the Low Countries.

In 1753 he published "An Account of Several Persons Seized with the Gaol Fever Working in Newgate; and of the Manner in which the Infection was Communicated to one Entire Family."³ A paper on "A Remarkable Case of Fragility, Flexibility, and Dissolution of the Bones"⁴; "A Letter upon an Extraordinary Agitation of the Waters"⁵; "An Account of the Earthquakes felt at Brussels"⁶; "An Account of the Agitation of the Waters on the 1st of Nov., 1756, in Scotland and in Hamburg"⁷; "An Account of the Case of the late Rt. Hon. Horace Lord Walpole"⁸; "An Account of the Virtues of Soap in Dissolving the Stone"⁹; "Some Remarks upon the Several Accounts of the Fiery Meteor which appeared on the 26th of Nov., 1758, and upon other such Bodies."¹⁰

Dr. Pringle was instrumental in securing better ventilation for those confined in ships, jails, barracks, and mines. He was also a pioneer of the antiseptic idea. He gave a good description of typhus fever, correlated the different forms of dysentery, and named influenza.

¹Edinburgh Med. Essays and Observations, 1742, V.

²Observations on the Diseases of the Army, London, 1752 (Phil. Trans. Roy. Soc., XXXXVI, XXXXVIII).

³Phil. Trans. Royal Society, 1753, XLVIII, p. 42.

⁴Phil. Trans. Royal Society, 1753, XLVIII, p. 297.

⁵Phil. Trans. Royal Society, 1754, XLIX, p. 360.

⁶Phil. Trans. Royal Society, 1754, XLIX, p. 546.

⁷Phil. Trans. Royal Society, 1754, XLIX, p. 550.

⁸Phil. Trans. Royal Society, 1755, L, p. 205.

⁹Phil. Trans. Royal Society, 1755, L, p. 221.

¹⁰Phil. Trans. Royal Society, 1755, LI, p. 259.

Dr. John Pringle was made Physician to the Queen's Household in 1761, and in 1763, Physician Extraordinary to the Queen. He was elected a Fellow of the College of Physicians, and in 1764 was made Physician in Ordinary to the Queen. In 1766 he was made a Baronet and in 1774 was appointed Physician Extraordinary to the King. He was a member of the Academy of Sciences at Haarlem and of the Royal Society of Goettingen; a Fellow of the Society of Antiquaries; a Member of the Royal Academy of Sciences of Madrid; of the Royal Academy of Medical Correspondence of Paris; of the Imperial Academy of Sciences of St. Petersburg; of the Royal Academy of Sciences of Paris; of the Royal Academy of Sciences and Belles Lettres at Naples, and many other local and foreign societies.

Dr. Pringle in 1772 was elected President of the Royal Society. In 1778, in his seventy-second year, following an injury from a fall, he retired from the presidency, being succeeded by Sir Joseph Banks. In 1780 he left London and retired to Edinburgh to live, but did not find his surroundings congenial, so he returned to London and resumed his Sunday evening conversazioni, which he found his chief delight.

Among his social friends were Lord Charles Cavendish, Mr. Cavendish, Dr. Ross, Dr. Heberden, Dr. Watson, Sir George Baker, and Dr. Richard Saunders. At one of their meetings he was seized with a fit, from which he never recovered. He died on January 18th, 1782, at the age of 75. He was buried at Westminster and a monument by Nollekens was erected to his memory in the Abbey.

In the preparation of this paper, the writer wishes to acknowledge the help obtained from the following sources: Pettigrew, *Medical Portrait Gallery*, London, 1840, II, No. 14; J. F. Payne, *Dictionary of Natural Biography*, 1896, XLVI, p. 386; Garrison, *History of Medicine*, 1917, p. 362.

URTICARIA PIGMENTOSA BEGINNING IN ADULT LIFE.***With a Report of an Extensive Case of Nine Years' Duration.**

By FRED WISE, M.D., New York City,

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Under the title, "Late Urticaria Pigmentosa, or Urticaria Pigmentosa Beginning After Puberty," M. B. Hartzell, of Philadelphia, read a paper before the Annual Meeting of the American Dermatological Association, Cincinnati, May 24-26, 1917.¹ I had the good fortune to hear and enjoy this paper and have since been on the lookout for instances such as Dr. Hartzell described. The case with which this brief paper deals is an unusually widespread eruption, constituting a striking example of urticaria pigmentosa first appearing in adult life.

In recent years, dermatologists have called attention to the fact that certain diseases of the skin which hitherto were almost always thought of as being peculiar to early infancy and childhood, may, in not a few instances, first appear during adult age. Under this category may be mentioned, beside urticaria pigmentosa, such affections as epidermolysis bullosa, ichthyosis, certain forms of nevi, and xeroderma pigmentosum.

Urticaria pigmentosa, sometimes called xanthelasmoidea, usually begins in the first year of life. In most cases the eruption appears before the child is six months old. At first the lesions may resemble the common infantile type of urticaria, later to become pigmented; or the trouble may manifest itself in the very beginning as pigmented spots; the lesions may appear in the form of ordinary wheals, or as papules, vesicles and nodules, among which macular lesions may be present. In some cases the pigmented macules and papules predominate; in others, papules and macules without evidences of pigmentation may be seen side by side with deep brown pigmented lesions; or all the spots may be of a distinct salmon-yellow color (xanthelasmoidea), difficult to distinguish from xanthoma. Itching may be absent, may be slight, or quite pro-

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¹Dr. Hartzell's paper will appear in the November, 1917, issue of The Journal of Cutaneous Diseases, Including Syphilis. It deals comprehensively with the subject, includes the author's personal cases, as well as a comprehensive bibliography.

nounced; in some patients itching seems to be entirely absent, in others it is a source of considerable discomfort.

Recently a child, four months old, appeared in Dr. Fordyce's service at the Vanderbilt Clinic, exhibiting numerous deeply pigmented, lentil- to pea-sized papules on the trunk, interspersed among which were a number of ordinary non-pigmented wheals, resembling mosquito bites. Itching, in this case, was quite severe. The eruption was most profuse on the abdomen, chest, back and buttocks. The mother stated that all of the brown pigmented spots had previously been common hives. Dermographism was manifested to a marked degree and upon being rubbed, the papules would enlarge and redden at their peripheries.

The prognosis, in these infantile cases, varies. In some patients the affection disappears spontaneously in early childhood or at the age of puberty. In others, the lesions persist through adult life, the disease exhibiting periods of exacerbation and remission. Treatment has been of little avail in influencing the progress of the dermatosis. The general health remains unaffected.

Instances in which the disease first manifests itself after puberty or in later adult life, are relatively rare, compared with the incidence of the affection in children. However, the literature contains a considerable number of reported cases of this kind. In 1905 Graham Little published a paper in which he included a compilation of 142 cases of urticaria pigmentosa, of which number 22, or over 14 percent, began at puberty or later. That there is no special age of predilection is evidenced by a case reported by Darier, a man in whom the disease first appeared at the age of 55 years.

In the adult cases the xanthoma-like lesions, frequently observed in children, are uncommon. The eruption is predominatingly macular in character, but there may also be many faintly marked, very slightly infiltrated, lentil- to pea-sized, flat papular elements, scattered among the macular lesions. As in the infantile variety, itching varies greatly in intensity, or it may be absent altogether. In adults, the coalescence of numerous macular lesions to form plaques, is not uncommon; in children such a fusion of the elements of the eruption is rarely, if ever, encountered. Most of the adult eruptions are reddish, bluish or violaceous in color, or there may be a combination and intermingling of these tints in the same patient. Dermographism is nearly always present, but true urticarial papules are unusual.

The etiology of the disease is unknown; it is probable that in a certain number of the cases the causative factors are the same as those of ordinary urticaria, and possibly as variable and manifold. Treatment has been ineffective.

PATHOLOGY.

The presence of large and small aggregations of mast cells in the corium and of increased pigment (melanin) in the epidermis and below it, are the interesting features of the pathology of the disease. The infiltration of mast cells varies greatly in different specimens. In some it consists of dense collections of these peculiar cells, packed up close to the basal layer of the epidermis, in the papillary and subpapillary portions of the corium. In other specimens, the cells are sparsely distributed in these localities, occurring in more or less isolated clusters. The mast cell infiltrations are commonly seen about the blood vessels, and the appendages of the skin—the hair papillae, sweat glands and sweat ducts. Thus the infiltrations frequently assume a columnar disposition. The changes in the epidermis are those due chiefly to pressure of the underlying structures. The basal cell layer is flattened and appears stretched. There may be a moderate degree of acanthosis. There is often a marked increase in pigment, deposited chiefly in the lower layers of the rete. The upper portion of the corium also may show some pigment cells. In some specimens, edema of the skin and dilatation of the blood vessels are prominent changes. Occasional leucocytic cell aggregations may be seen in the corium.

Eruptions have been described which are clinically indistinguishable from urticaria pigmentosa, in which microscopic examination has failed to reveal evidences of the presence of mast cells in any portion of the skin. The classification of such dermatoses is a matter of controversy among dermatologists. Such cases have been designated "urticaria with pigmentation," instead of urticaria pigmentosa. Dr. Hartzell, in the paper mentioned, pointedly calls attention to the possibility that mast cells may have been present in some of these "mast-cell free" eruptions at one time or another, to have disappeared at a later period in the evolutions of the affection.

REPORT OF CASE.

J. P., male, aged 51 years, a Russian by birth, was married, and had lived many years in this country. His occupation was clothes-presser. The family and personal histories were negative. The Wassermann test was negative and the general health of the patient was good. The urine contained a moderate excess of indican, but was otherwise normal.

The man appeared at Dr. Fordyce's service in the Vanderbilt Clinic, August 24th, 1917, complaining of moderate itching of the skin of the entire body. The eruption had been present since nine years. It began gradually, in the form of a number of brownish, flat, smooth spots on the chest, back and abdomen, accompanied by considerable itching, especially at night. These spots slowly increased in number, until nearly the entire body-covering was implicated in the eruption. In some areas the spots assumed a purplish and violaceous hue, in others, a reddish tint. During the past three or four years, new spots have made their appearance. None of the lesions had disappeared, so far as

the patient knew. Occasionally, a mild attack of ordinary hives would cause an increase in the pruritus. In the meantime, the patient's general health remained unaffected.

Skin.—The eruption is widespread and abundant, implicating the integument of almost the entire body. It is made up of areas of diffuse redness; reddish, brownish and violaceous macules; barely elevated, faintly discernible, yellowish and brownish papules; and innumerable freckle-like spots. In addition, there are irregular plaques, resulting from the coalescence of some of the elementary lesions. The areas of diffuse redness are most pronounced on the neck, face and scalp, in which regions the appearance is like that of weather beaten skin, a mingled reddish and brown tint. The skin of the entire back, chest and abdomen, and, to a lesser extent, the buttocks, arms and legs, presents a multitude of red, brown and violaceous macules, varying in size from a pin-head to a dime. They are circular and oval in outline, well-defined, some of them being almost imperceptibly raised above the level of the surrounding narrow border of unaffected skin. In some of the lesions, the palpating finger may elicit a slight sense of resistance (infiltration). Many of the spots give the impression of being purpuric—pressure with a glass spatula does not cause a subsidence of the depth of color in them. On both sides of the back, especially below the shoulder blades, many of the lesions have fused, forming diffuse brown and violaceous patches, irregular in outline and with ill-defined borders. Viewed with the light striking the skin at a slant, many slightly elevated, pinhead- to lentil-sized, round and oval papules may be distinguished, generously interspaced among the macular elements. These papules are a little firmer than the adjacent unaffected skin. On the trunk there is slight furfuraceous scaling, and in some areas, notably the upper portion of the back, the surface of the lesions appears to be finely wrinkled. On the upper arms and on the legs the lesions are less abundant and more widely scattered. Pigmented macules make up a large part of the eruption as a whole; they are largest and most pronounced on the backs of the hands. Their color varies from *café au lait* to a deep brown. A few faintly outlined lesions are present on the palms and soles. The mucous membranes, nails and hair are unaffected.

About four years ago, the patient had taken arsenic in the form of Fowler's solution, over a period of about six months, without provoking any visible effect on the dermatosis. There are no evidences of arsenical keratoses on the palms and soles, and the freckle-like lesions had been present for five years before the arsenic was administered. There had been no other internal medication.

When vigorously rubbed, the lesions assumed a more pronounced reddish hue and became more prominent. Dermographism could be elicited on all parts of the integument, more especially on the abdomen and back.

Microscopic Examination.—Excepting a mild grade of edema of the rete layers, the epidermis is normal in appearance. The basal cell layer presents a broken line of deeply stained, brown pigmented cells, regularly disposed, side by side, varying from one to two layers in width, in different parts of the section. These cells are most abundant at the bottom of the interpapillary pegs; here and there, an occasional pigment cell is found higher up in the rete. The pigment granules (which consist of melanin) are well stained and quite prominent. In the cutis there are no free pigment cells.

In the corium there is considerable edema, most marked in the papillary and subpapillary portions. Here, also, are seen accumulations of mast cells, most abundant in the subpapillary layer and arranged in ill-defined clusters. In some areas they are abundant, lying in the vicinity of blood vessels, in others, they are relatively sparse and irregularly scattered, apparently without showing a predilection for the blood vessels and lymph spaces. These mast cells are circular, oval, stellate and fusiform; some of them have vague and distorted outlines, others possess a definite limiting membrane, within which the granules are closely packed; others again, show marked signs of disintegration, the granules scattered within the protoplasm of the cells, or lying free in the proximity of, and between individual cells. In the papillary bodies the mast cells are few in number, and in the deeper portions of the cutis, they are absent. A moderate number of such cells appear in the vicinity of the hair follicles, but none is seen about the glandular structures. The blood vessels are dilated and somewhat increased in number. Here and there are a few small collections of mononuclear leucocytes, in different portions of the subpapillary layer.

Summary.—An eruption of urticaria pigmentosa appears in an otherwise healthy man, at the age of 42 years. The eruption is not preceded by pronounced urticarial manifestations, although pruritus was a marked subjective symptom early in the disease. The eruption is unusually widespread, being well-nigh universal in distribution.

Histological examination of some of the lesions reveals the presence of increased pigment and of aggregations of mast cells in the cutis.

Differential Diagnosis.—At first sight, the dermatosis above described closely resembled a wide-spread eruption of pityriasis lichenoides chronica (papulo-macular parapsoriasis). (See Figs. 4 and 5.) Indeed, I presented the patient with this erroneous diagnosis, before the Section on Dermatology, at the New York Academy of Medicine. In the discussion which followed the case-presentation, the majority of the members expressed the view that the eruption was not one of parapsoriasis, but rather an example of urticaria pigmentosa. Dr. Lapowski, whom the patient had consulted in the earlier years of his malady, recognized both the patient and his eruption, recalling the fact that he had made the diagnosis of urticaria pigmentosa at that time, perhaps six or seven years ago. Dr. Pollitzer stated that a differential diagnosis between papular and macular parapsoriasis and urticaria pigmentosa, was a difficult matter in this instance, but he was more in favor of the latter diagnosis.

The accompanying illustrations (Figs. 2, 3 and 4, 5) show the striking resemblances between the two eruptions, much better than

Wise: *Urticaria Pigmentosa*



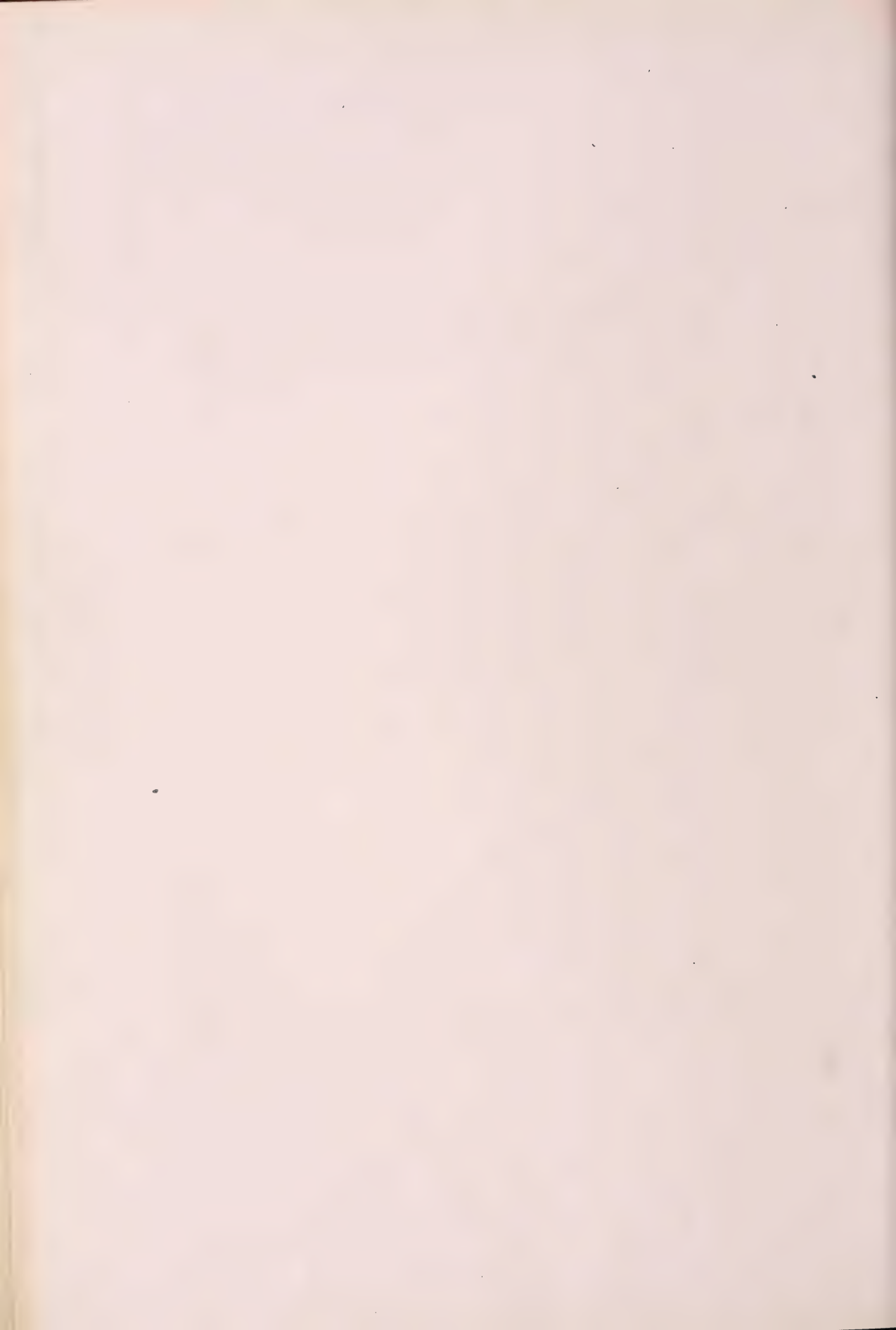
Fig. 1.—*Urticaria pigmentosa infantum*. Note the large macules on the upper portion of the back, and the sharply defined papular lesions of ordinary urticaria on the lower back and the buttocks.



Wise: *Urticaria Pigmentosa*



Fig. 2.—*Urticaria pigmentosa adultorum*. Front view. Disease began at the age of 42 years and is of 9 years' duration.



Wise: Urticaria Pigmentosa

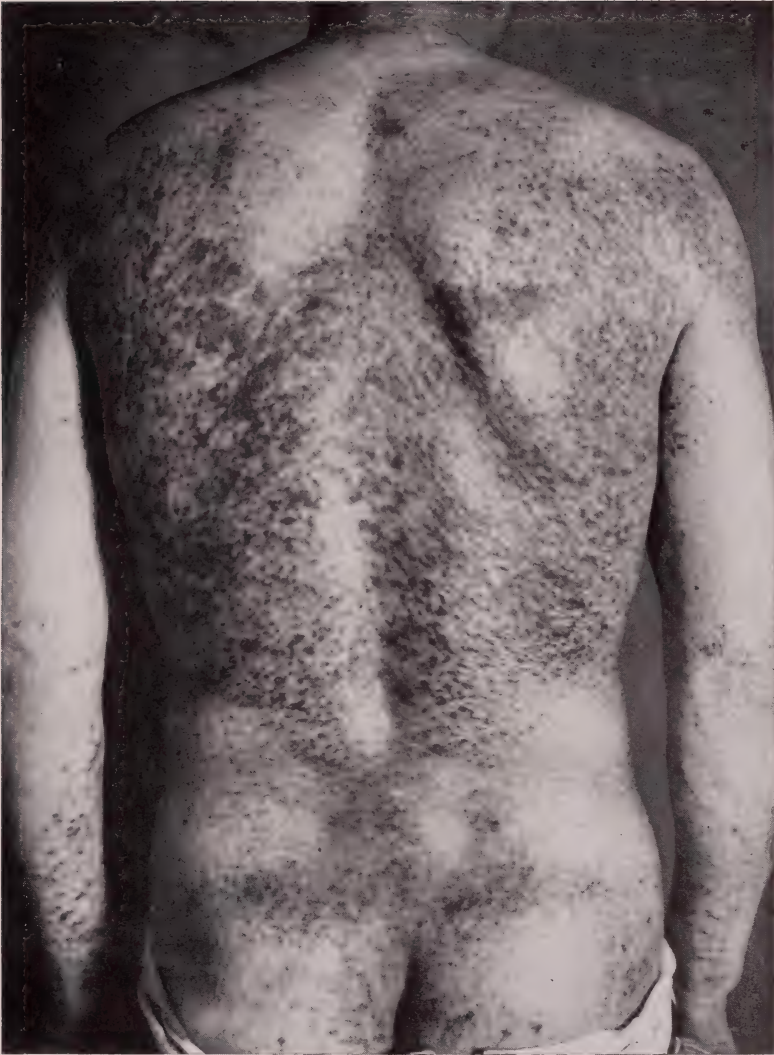
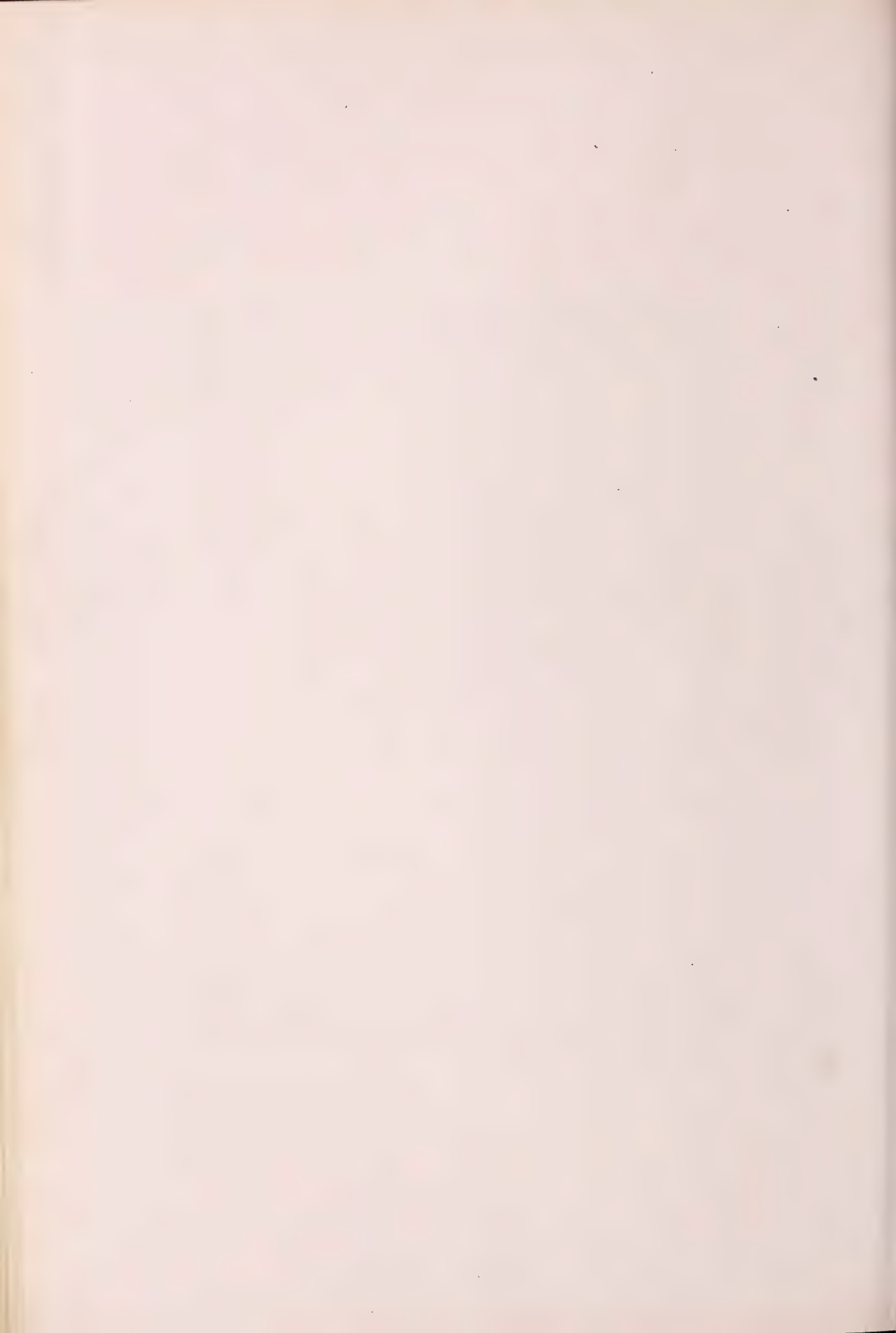


Fig. 3.—Urticaria pigmentosa adultorum. Rear view of same patient shown in Fig. 2.





Fig. 4.—Papulomacular parapsoriasis. (*Pityriasis lichenoides chronica*). Front view. Note the resemblance of this eruption to that shown in Fig. 2.



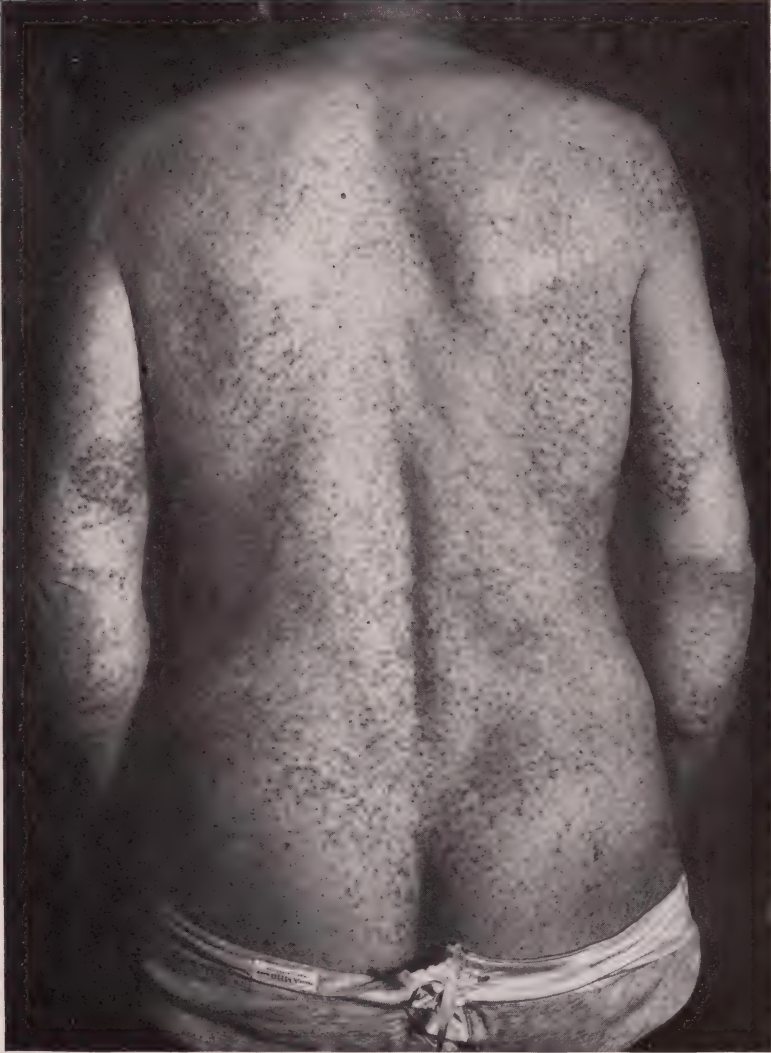


Fig. 5.—Papulomacular parapsoriasis (*Pityriasis lichenoides chronica*). Rear view of same patient shown in Fig. 4. Note the resemblance of this eruption to that shown in Fig. 3.



words can express. The case of parapsoriasis (pityriasis lichenoides chronica) here reproduced, was described in an article appearing in the *Journal of the American Medical Association*, July 15, 1916, LXVII, p. 159, together with the microscopic study confirming the clinical diagnosis. Even on closer scrutiny, the two eruptions looked very much alike; the chief difference between the two being that the freckle-like or lentiginous spots were absent in the case of parapsoriasis. Furthermore, the parapsoriasis eruption presented a peculiar burnished appearance, like that seen in diffuse lichen planus, for which exanthem the eruption was actually mistaken. In the case of urticaria pigmentosa, such a lichen-like appearance was not manifest. Some of the lesions in the case of urticaria pigmentosa resembled purpuric spots, but the diagnosis of purpura was not seriously considered, in view of the many other peculiar features of the eruption, which, taken as a whole, spoke against purpura.

I am indebted to Dr. MacKee for the photographs and to the pathological laboratory of the Department, for the stained sections of tissue.

SOME REMARKS ON MOTOR INSUFFICIENCY AND DILATATION OF THE STOMACH.

By GEORGE M. NILES, M.D.,

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According to Stoker, the stomach exercises a so-called double motor function, namely peristole and peristalsis. The former is the process by which the food, as it reaches the stomach is grasped and mixed by the reflex muscular action of the fundus, and the latter consists of the wave from fundus to pylorus driving the food out of the stomach. According to whether one or both of the above-named functions of the stomach are disturbed, and also according to the degree of the disturbance, we differentiate:

1. Hypotony, or motor insufficiency of the first degree (Boas).
2. Atony, or motor insufficiency of the second degree (Boas).
3. Gastrectasis, due to mechanical obstruction at the pylorus.

Motor insufficiency of the first degree (myasthenia) depends upon a primary relaxation of the muscular wall of the stomach. This relaxation may result from bad habits, gastronomic excesses frequently committed, or prolonged use of narcotic or hypnotic drugs. We also find this form of motor insufficiency with or following grave anemias, infections, severe hemorrhage, childbirth, chronic gastritis, or chronic constipation.

Diagnosis.—Atony may be present without characteristic physical signs, unless repeated examinations are made, especially two or three hours after eating.

To the observer of experience much is learned by an inspection. Stout, robust-looking individuals, with broad costal angles would hardly suggest gastric atony, while delicate, high-strung individuals with sharp costal angles are particularly susceptible to this condition.

An atonic stomach, as stressed by Lockwood, need not necessarily be a large stomach at all times, but it tends to sag upon slight provocation, is abnormally distensible, and varies greatly as to the position of the lower border. When the patient stands, and several glasses of water are taken, the lower curvature may reach two or more inches below the umbilicus, while when lying down and the stomach is completely empty, the whole organ may lie above the umbilicus.

The normal tonic stomach is no larger than its contents, but in the atonic stomach, splashing may readily be elicited, if half glass of water is taken on an empty stomach. Exception might

be made in thin primiparae with incompetent abdominal walls. In atony visible peristalsis is never observed.

The roentgen diagnosis of atony is most helpful, and is based on the examination of two sets of plates, one taken directly after a barium meal, and the other in six hours. Differentiation must be made from pyloric stenosis, ulcer of the lesser curvature, cancer, or perigastric adhesions limiting free motility. Another barium meal may be given after the six-hour plate has been taken, which will accurately show the outline of the filled stomach. The second barium suspension meal, given after the first six-hour plate, will demonstrate the different appearances of the filled stomach. This classification gives us a method of testing the motility of the stomach far in advance of anything obtained by the ordinary clinical methods. It might be stated that the normal time for the evacuation of four ounces of barium and twelve ounces of buttermilk is about four and a half to five and a half hours. If any considerable amount of residue is observed after six hours, there are grounds for a suspicion of either spasmodic or permanent contraction of the outlet. For further descriptions of roentgen appearances of the stomach, the reader is referred to special treatises on that subject.

Treatment.—This should be regulated upon the principle of resting the stomach muscles and improving their tonus. The diet should be so adjusted that the least demands are made upon the motor activity of the stomach, and the least weight placed upon the incompetent supports. The meals should be small in quantity and comparatively frequent. Should the motor power be quite deficient, either liquid or semi-solid food should be given for a while. Water should be drunk in plenty, but in small amounts at a time. The stomach will generally be found to easily care for and expel adequate amounts of liquid, so they are taken in small quantities at a time. Milk holds the foremost place in the list of foods, and by frequently giving a glassful, enough milk alone may be ingested to well nourish the resting body. In cases of hypersecretion or hyperacidity with atony, Strauss recommends a strictly protein-fat diet, to obviate the carbohydrate fermentation which would otherwise result from insufficient starch digestion. Protein in such cases may be taken in solid or semi-solid form, but it should be thoroughly cooked. In subacid conditions, the general principles obtaining in the treatment of subacid gastritis also apply. The diet may contain a large proportion of fat, and meats, if allowed, should be finely subdivided and well masticated. Eggs may be allowed, and some carbohydrates in the form of flour soups, leguminous soups or vegetable pureés, all of which should contain as much butter and milk as possible. Alcohol should be prohibited, unless in the form of very small quantities of mild claret, and

only then as a compromise to one who is perhaps habituated to the use of strong drink.

Lavage.—This is not specially indicated in atony of the first degree, though a not too frequent lavage with a very weak nitrate of silver solution may be of benefit.

Electricity and hydrotherapy both have appropriate uses.

Medical Treatment.—The alkalies are naturally indicated in simple atonic cases with hyperacidity. The light calcined magnesia when there is a tendency to constipation, and bismuth or heavy magnesia when the bowels are loose, may be given. Sodium bicarbonate should not be given, as it produces too much carbon dioxide. In the presence of fermentation, resorcinol, salicylic acid, salol, or menthol may be combined with the alkalies, plus suitable carminatives for the eructations. In subacid or anacid conditions, the dilute acids may be given in small doses after meals, while nux vomica, condurango, or the other bitter tonics may be administered before meals.

MOTOR INSUFFICIENCY OF THE SECOND DEGREE.

This is also called chronic dilatation of the stomach, isochymia, and ectasia ventriculi.

We must not commit the error of mistaking gastropptosis for dilatation. With the former the upper border of the stomach descends as well as the lower border, and there are generally movable kidney and enteropptosis. The prolapsed stomach may in addition be dilated. In dilatation the upper border does not descend, but maintains its relation with the diaphragm, and the stomach is dilated chiefly in the direction to which the greatest force is applied, downwardly and laterally. Dilatation may also ensue in the transverse and anteroposterior dimensions, and the pylorus may be a little further to the right and in a slightly lower plane, but the lesser curvature maintains its relation to the diaphragm, and this is the differential point between dilatation and gastropptosis.

In insufficiency of the second degree the food remains in the stomach still longer than when the peristole alone is disturbed, and with the dilatation there is an inability to expel its contents within the normal limit of time. Investigation has shown us that a certain amount of stenosis of the pylorus is responsible for nearly every case of motor insufficiency of the second degree. This stenosis may result from various causes, but it is nevertheless there, either periodically or continuously.

Einhorn uses his duodenal bucket of different sizes to test the patency of the pylorus. This is swallowed, allowed to remain over night, and on being withdrawn the next morning, is examined for pancreatic ferments, which, if found, show that the pylorus is patent. Einhorn has also drawn attention to the fact that, if

there be an ulcer in the tract traversed by the cord the silk may be blackened and discolored at that point, affording a clue to the site of the ulcer.

Diagnosis. Atonic Type.—In this condition the symptoms are not always referred to the stomach, but just as often to the nervous system, and the patient is prone to become melancholic or neurasthenic. There is frequent belching, and a sense of uneasiness in the epigastrium, but acute dyspeptic symptoms may be absent. Occasionally, in extreme dilatation, there may be vomiting of large quantities of fluid, but not as much as in the stenotic type. Chronic gastritis with the attendant symptoms are sometimes associated; rarely hyperchlorhydria.

The gastric findings are variable; fermentation is frequent, while subacidity or absence of hydrochloric acid is often the case; hyperacidity is seldom noted, while Kemp reports a few instances of achylia.

Stenotic Type.—This may be congenital, or acquired from ulcer, cicatrices following burns from acids or alkalies; from severe gastritis producing hypertrophy at the pylorus, repeated pylorospasm from extreme acidity; pressure from large gall-stones; perigastric adhesions; sclerosis in the pyloric end of the stomach; and often a stenosis from beginning or slightly advanced malignant disease of the pylorus. Secondary dilatation may also arise from decided stricture of the duodenum or a kink there from "water-trap" stomach.

The symptoms of dilatation of the stomach due to pyloric obstruction are quite characteristic, being modified when malignancy is a factor. When congenital, they come on directly after birth, or a few weeks later, depending on the degree of stenosis. There are present wasting, projectile vomiting, visible gastric peristaltic waves, non-fecal bowel movements, and in some instances a palpable tumor in the region of the pylorus. Projectile vomiting, occurring early in an otherwise healthy appearing infant, when the mother's milk is normal, should quickly excite suspicion of congenital pyloric stenosis. In other cases, where there can be detected no pyloric thickening, where the bowel movements are occasionally fecal, and where, in spite of the projectile vomiting, there is no rapid loss of weight, the condition is probably due to pylorospasm. Many of these latter cases are wrongly diagnosed, being considered cases of difficult feeding.

Acquired Stenosis of the Pylorus.—The symptoms are thirst, dryness of the throat, dry skin, cramp-like pains of considerable severity, peristaltic restlessness of the stomach, and vomiting of much chyme, often containing remnants of food taken the day before, or even several days before. The bowels are constipated, and emaciation rapidly supervenes. Intestinal fermentation and putrefaction with indicanuria are often present.

The benign type of stenotic dilatation may pursue rather a long course, with periods of improvement under appropriate treatment, but with a tendency to relapse.

In the malignant type there is marked cachexia, rapid emaciation, either coffee-grounds vomitus or that with occult blood, free hydrochloric acid diminished or absent, lactic acid and Boas-Oppler bacilli present, undigested meat, and the age of the patient forty-five or over. A confident diagnosis of malignant stenosis is justified, under such conditions.

Einhorn directs the patient to eat a supper containing a liberal quantity of rice and raisins. If these two foods are still in the stomach in appreciable quantities the following morning, he diagnoses marked stenosis of the pylorus. Weinstein asserts that any patient in whom a considerable proportion of a mixed meal is found in the stomach seven or eight hours after eating it, is affected with pyloric stenosis.

Treatment.—The acute cases of congenital stenosis in young infants should receive prompt surgical attention. Other treatment is futile, and the reported cures have probably been cases of pylorospasm.

Atonic dilatation is by far the most frequent condition that calls for treatment, being found among those who are hearty, and rapid eaters, or who drink immense quantities of fluid, fermented or otherwise. Associated with this we often find disturbed acidity or chronic gastritis.

Dietetic regulations are important, and a light, rather dry diet, as in chronic gastritis is proper, with modifications suited to the amount of acid and other juices secreted. Sufficient water should be allowed, but in moderate quantities at a time.

Orthopedic Treatment.—In this form of dilatation, unless there is stenosis of marked degree, certain supportive measures will be found most useful. I have in many instances employed the Rose adhesive belt, and have been able to demonstrate a heightening of the lower border of the stomach by 2 or more inches. The belt, if worn several weeks, will increase intra-abdominal pressure, and in the meanwhile, if the patient is well and properly nourished, a certain amount of abdominal fat will be accumulated, which will bring about permanent benefit. Silk and elastic abdominal supports are not as serviceable as the adhesive bandage which stays on continuously.

Hydrotherapy.—Much assistance may be obtained from rational hydrotherapy, persistently and intelligently applied. Foolish hydrotherapy is a bane from which many atonic patients suffer, and unless proper facilities and experienced attendants are available, this part of the treatment had best be omitted. The fan and Scotch douche applied to the epigastrium, and cold compresses and sponging are included in the use of water.

Lavage.—This, too, has an important place in the treatment, particularly in the more severe cases where the stomach is emptied with difficulty, and some fermenting residue is often left there. It is best, if practicable, to thoroughly wash out the stomach just before bedtime, as the muscles of that viscus will then have all night in which to rest and accumulate renewed tonus. J. W. Weinstein is strongly in favor of lavage at this time, and endeavors to see his atonic patients as late as possible in the evening. Should this period for lavage not be convenient, the early morning hours before food is taken are the next best. The aim is to wash out superfluous mucus but not food, for if too much of the nourishment is lost with the lavage, the patient suffers in nutrition.

In cases of subacidity with fermentation I use in the lavage one of several antiseptics, as potassium permanagnate, ichthyol, liquor alkaline antiseptic (N. F.) or even creolin. In hyperacid cases I use calcined magnesia, soda bicarbonate, boric acid, or lime water. In constipated habit, I allow one or more teaspoonfuls of calcined magnesia mixed with the last half pint of water to remain in the stomach. This generally exerts a mild and pleasant hydragogue cathartic effect. Electricity, massage, and systematic methods of exercise have their proper and useful place in the treatment of this diseased state, but none of these should be attempted except under competent advice. I often have these sufferers consult me who report various bizarre exercises taken upon the suggestion of zealous but ignorant friends, and find that they have sustained injury thereby.

Medication.—Acids, if subacidity is present; alkalies, if hyperacidity is found; bitter and ferruginous tonics, if anemia be in evidence; gentle laxatives or enemas for constipation; stomachics before meals, if the appetite is lacking; nerve sedatives (not habit-forming ones) for unstable and distressed nerves—all these are indicated in motor insufficiency of the second degree.

Treatment of Stenotic Dilatation (Non-Malignant).—The treatment afforded this condition by the internist is at best only palliative. No roseate promises of permanent improvement can be honestly given, for they must look to surgery for relief.

If for any reason surgery cannot be obtained, frequent lavage, duodenal or rectal feeding, and the administration of either olive oil or liquid albolene are the best that medical aid can offer. If the pylorus is not entirely obstructed, liquid food may be given, and if the patient will lie on his right side for an hour or more afterward, much of it may pass the pylorus. Einhorn has recommended his pyloric dilator, but its use will seldom be found possible, and, while efforts are being made in this direction, valuable time is lost. Unless there is some positive contraindication to surgery, the patient should seek that form of aid; any other form of therapy is simply dalliance with disease.

CANCER OF THE RECTUM AND COLON—ITS SYMPTOMS AND DIFFERENTIAL DIAGNOSIS.

By CHARLES J. DRUECK, M.D., Chicago,

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Surgeon to Peoples Hospital.

Symptoms.—Cancer within the rectum begins insidiously and often gains so much development before the patient is aware of its significance that it is beyond hope of a complete cure. He supposes he has some simple rectal or intestinal ailment and dismisses it from his mind because he objects to an examination. The mild character of the symptoms for some time is peculiar to cancer situated above the middle of the internal sphincter, the bowel having so little sensitiveness that considerable growth and even ulceration may exist without causing much uneasiness. However, when the disease is below the sphincter, there is great pain and the suffering itself may be of assistance in making an early diagnosis. Very early in the history of the disease, there is uneasiness in the rectum which grows worse each time the bowels move as though they had not completely emptied. There is also a bearing down and if the disease is near the anus this straining is sometimes violent. Vague discomfort in the pelvis, persistent intestinal or gastric indigestion, increasing constipation or colicky tenesmus with or without the passage of blood or mucus demand a careful examination, not only digitally but also with the proctoscope or sigmoidoscope and the x-ray.

Pain.—The pain of rectal cancer is variable. Early in the disease it is usually not severe, but later it is often intense and is the most important symptom to be treated. If the anus is eroded, the pain is similar to that of irritable ulcer or fissure and begins as early as the growth pushes through the mucous membrane. Pain or cramp in the lower extremities is a bad sign, for it suggests encroachment on neighboring nerves either by stretching or pressure of the cancerous mass itself or of the infected glands. Later pain also occurs from irritation of the ulcerated surface by the feces, especially when the anus is ulcerated. Each condition must be carefully diagnosed, as each requires special treatment.

Slight morning diarrhea or, rather, several movements consisting of mucus and feces is the first inconvenience noticed. Later a sanious discharge containing shreds of broken down growth escapes, at first only during defecation, but more or less continually later, as the sphincters lose their usefulness, and it excoriates the

anus and skin about the parts. This discharge has the odor of decayed flesh and once recognized is never forgotten. It is similar to the odor of cancer of the uterus.

Ulceration.—The ulcerations of the cancer that produce the fetid discharge are of two kinds, that above the stricture and that of the growth itself. Ulceration developing above the growth differs from the cancerous necrosis in that it is superficial in depth, has a clean, smooth base, and low, even edges. It results from pressure of and toxins absorbed from the retained and hardened feces that are lodged in the dilated portion of the rectum immediately above the obstruction. When the obstruction is relieved, these masses are found to be dry and of almost stony hardness, and are so imbedded in the tissues that when removed they leave ulcerated spaces beneath them.

Degenerating Cancer.—The ulceration of degenerated cancerous tissue is different. Early in the disease the normal mucous membrane is movable over the growth, but the cancer soon breaks down; this degeneration may occur at one or several places simultaneously and the mucous membrane be honeycombed with ulcerating spots through some of which the cancerous mass may protrude. Ulceration begins at the central or denser parts of the cancer and is not limited to the super-imposed mucous membrane, but invades the deeper structures and in some cases extends into neighboring organs. The bladder frequently is opened and a urinary fistula produced, the urine escapes through the rectum; and sometimes the feces are forced into the bladder and through the urethra, causing excruciating pain. This is one of the most urgent indications for colotomy. The prostate or seminal vesicles in the male, or the retrovaginal septum in the female, may be destroyed. When the prostate or urethra are involved obstruction to urination begins, and if the disease extends to the bladder wall cystitis develops. Smith records a case where the disease opened into the hip joint. While the center is degenerating the periphery is advancing into new tissues. Around the edges the growth, together with the inflammatory reaction, raises the borders and gives the ulcer a crater-like appearance. The muscular tissue seems to have a greater resisting power and prevents somewhat the extension of the ulcerative process. The extension, however, progresses irregularly and creates a ragged edge. Gangrenous shreds of tissue are cast off and these have a very foul odor. As cicatrization occurs, the rectum grows shorter until it may be only one-half to one-fourth its normal length. This contraction and the associated loss of fat about the parts produces the funnel-shaped anus so pathognomonic of cancer.

Hemorrhage.—Hemorrhage from cancer occurs frequently but is

seldom profuse enough to be dangerous, although anemia produced by the repeated loss may be an element in hastening the end.

The encephaloid cancer is prone to bleed because it breaks down so easily and so early. When mucus and blood is expelled, it shows the presence of ulceration; it is found in 90 percent of all cases of encephaloid growths. The hemorrhage occurs frequently and is usually slight, but its persistence produces anemia and this is an element in hastening the end. In the soft cancers there may be a discharge of free blood, which rapidly weakens the patient, but the scirrhus growths bleed only sufficiently to smear or streak the stool, if they bleed at all.

Obstruction.—Obstruction is variable in its symptoms; sometimes advanced scirrhus cancer which has narrowed the lumen of the bowel until it will hardly admit the end of the finger will cause little or no obstruction. Not infrequently the passage of feces is never much interfered with, because ulceration begins early and the growth sloughs off enough to keep the passage open. When obstruction exists and is located in the lower rectum or at the anus, the feces are ribbon-like in shape or small pea-like balls or else the frequent efforts at defecation bring away small amounts of feces mixed with muco-pus and resembling diarrhea. Blood is frequently mixed with the feces, suggesting a dysentery instead of the real disease.

Ulceration into the surrounding tissues with the production of an abscess and fistula allows the extravasation of feces and often a large dissecting abscess. The obstruction when present is similar to that of simple stricture and not in any way pathognomonic of cancer. The patient's history does not differentiate the disease and all depends on a physical examination, which requires great care and delicacy.

Cancer in this region is of rapid growth and if a patient asserts the stricture has existed for many years it is evidently not malignant, although it must be remembered that carcinoma may be engrafted upon any benign growth or ulceration.

In the encephaloid cancer the passage of the feces is not so frequently interfered with because ulceration begins early and the growth sloughs away enough to keep the passage open. Blood, mucus and pus mixed with the feces suggests a dysentery instead of the real disease. Ulceration into the surrounding tissues with the production of an abscess and fistula allows the extravasation of feces and often a large dissecting abscess.

Examination.—Digital examination is of great value in all rectal strictures, and in cancer it is absolutely necessary because here a hard nodular mass will be found which involves perhaps only one side of the rectum, while the other side is covered with normal mucous membrane; or the mass may encircle the rectum, leaving

only a small opening in the middle. Its peculiar character on palpation is a hard, rough, irregular mass projecting into the rectum, easily differentiating it from simple stricture, which is smooth, or a tubercular stricture, which undermines surrounding areas.

The commonest form of cancer within the rectum is the scirrhus. It usually occurs just above the internal sphincter or in the ampulla of the rectum. It begins more frequently on the anterior wall of the rectum, but may occur elsewhere. It arises as a hard, nodular mass and extends circularly until it involves the whole circumference of the rectum, leaving only a small opening in the middle. This latter condition is the usual finding when the physician is consulted. Mickulitz found three-fourths of his cases so progressed. Gussenbauer estimates that 65 percent of all rectal cancers are of this variety. These cancers grow lengthwise of the bowel very slowly and rarely involve more than two inches.

Cancers high up in the rectum and in the sigmoid are the most difficult to diagnose and have been repeatedly mistaken for diseased ovary of tube or for other pelvic tumors.

The encephaloid cancer occurs as a soft polypoid mass very like a benign adenoma but has a broad base which infiltrates the submucous tissue. These tumors contribute 15 percent of the rectal cancers. They break down very early and with few exceptions have reached this ulcerative stage by the time they are seen by the physician. By palpation irregular masses appear to have been broken off roughly. Raised edges surround the ulcer and give it the crater-like appearance. The finger being well anointed and inserted feels this rough irregular edge all around the constriction and then suddenly passes into a wider channel above where frequently masses of hardened feces are found. Exceptionally, a softer polypoid mass is found simulating a benign adenoma, but having a broad base which infiltrates the submucous tissue. Every possible care must be taken in passing the finger through the obstruction where it surrounds the rectum, especially if near the peritoneal surfaces, for fear of tearing through the friable wall and entering the abdomen. The necrosis may leave a very thin partition at some one point or the ulceration in the bowel above the obstruction may be very deep. The finger must never be pushed hurriedly through a carcinomatous stricture and even soft bougies must be used with great caution. Numerous cases of rupture and sudden death have resulted from carelessness in making an examination.

Cachexia.—Cachexia appears earlier in cancer of the rectum than when the disease appears in other parts of the body, probably because the ulceration and breaking down of tissue produces a constant absorption of toxins and septic matter, which brings on an emaciation even when there are few or no local symptoms. Meta-

static growths in the liver, lungs, kidneys and other organs, of course, accelerate the general breakdown. However, in some cases, the appearance of vigorous health is maintained until late in the disease; any case of gradually developing obstruction of the bowel with progressive loss of weight and strength in a middle-aged person is always suspicious, especially if inquiry brings out a history of constipation or spurious diarrhea.

Lymphatic enlargements is a valuable sign and may generally be found if properly sought for. There are, however, two sets of lymphatics involved in this region. One set arising from the anus and surrounding integument terminates in the glands in the groin,



Man, aged 61, prone enema. Roentgen conclusions—extensive new growth of descending colon, sigmoid, and rectum. Operative findings—complete involvement of the whole pelvic cavity. Carcinoma. A, descending colon; B, rectum; C, sigmoid the only portion of lower bowel that is normal. Taken from "Roentgen Diagnosis of Surgical Lesions of the Gastrointestinal Tract," George & Leonard.

while those from the rectum proper end in the sacral and lumbar glands. Therefore, in disease within the rectum the infected glands are to be palpated along the spinal column and deep in the pelvis because unless the external parts are involved the inguinal glands may be nearly or quite normal and a thorough examination of the deep systems will determine the advisability of operation or only palliative treatment.

Another point in the diagnosis is that these enlarged glands or the cancer mass itself may produce pressure symptoms in parts quite distant or independent of the rectum. Pressure on the iliac

vein will cause edema of the legs, a condition that occurs frequently in the later stages of the disease.

Lines of Extension.—Epithelioma at the anus extends by continuity through the skin to the scrotum, vulva, vagina and up into the rectum. The inguinal glands are involved and also the middle hemorrhoidal through which abscess of the ischio-rectal fossa arises. Within the rectum cancer extends to the contiguous genito-urinary organs and backward to the coccyx. The retro-rectal and hypogastric glands are involved.

Differential Diagnosis.—Cancer of the rectum may be confused with a number of other conditions benign, inflammatory and traumatic occurring either within the rectum or in the pelvic structures.

Epithelioma at the anus may be mistaken for fissure, condyloma, tubercular deposits, actinomycosis or an ulcerated hemorrhoid.

A malignant tumor is to be suspected within the bowel in any adult where a bloody diarrhea exists that cannot be accounted for by parasites or bacteria. Digital examination is sufficient only if the tumor is low down (within 4 inches from the anus). Ten inches may be inspected through the protoscope and even a greater length may be examined with a bimanual examination. Benign tumors as a class are soft, have pedicles, project into the lumen of the bowel, are movable, and do not invade surrounding tissues, while the malignant growths are more or less solid or hard, and spread out between the mucous and muscular coats of the rectum in such a way that they invade several square inches of the bowel and yet project very little if at all into the rectum. All growths with a broad infiltrating base are to be considered malignant. Where secondary growths in other organs produce symptoms before intestinal obstruction occurs the local symptoms may be obscured and the diagnosis clouded.

Scirrhus cancer if seen early presents through the proctoscope a stiffening induration on one side which closely resembles fibrous stricture, but the history of the trouble will differentiate the two. Carcinoma begins insidious, whereas inflammatory stricture follows trauma, ulceration or suppuration. Later, when obstruction begins, there occurs colicky pains in the stomach or small intestine and occasionally sharp cutting pain in the region of the growth. Intense peristalsis above the mass produces intussusception. The location of the trouble is of much significance because fibrous stricture occurs usually in the rectum and rarely in the sigmoid, whereas scirrhus cancer is uncommon in the rectum but is generally found in the sigmoid.

Medullary cancer presents a very different pathological and clinical picture. Constipation may not be noted, but in its stead a teasing tenesmus with a passage of flatus, mucus and perhaps blood.

Although the sufferer may defecate twenty times during the morning there is always a feeling of something left in the rectum. This diarrhea is most urgent in the morning and is spoken of as a morning diarrhea. The first passage in the morning is mostly mucus, pus and blood, a little later there is a good fecal evacuation, but during the rest of the day the evacuations are gas and mucus accompanied with much teasing tenesmus. Hemorrhage is variable. Through the proctoscope is seen a red berry like mass projecting from the side of the gut with a pale areola of mucous membrane about it.

Encephaloid cancers break down and ulcerate early. At first the normal mucous membrane is movable over the growth, but it soon ulcerates; this degeneration may occur at one or several places simultaneously and the mucous membrane is honeycombed with ulcerating spots through some of which the cancerous growth may protrude. Ulceration begins at the central or denser parts of the cancer and is not limited to the superimposed mucous membrane, but invades the deeper structures and in some cases extends into surrounding tissues. While periphery is advancing into new tissues the center is undergoing degeneration. Around the edges the new growth, together with the inflammatory reaction, raises the borders and gives the ulcer a crater-like appearance. The muscular tissue seems to have greater resisting power and prevents somewhat the extension of the ulcerative process. The extension, however, progresses irregularly and creates a ragged edge. If the tumor is high in the sigmoid or in the colon the diarrhea may be so annoying as to make the proctoscopic examination unsatisfactory without first thoroughly irrigating the bowel.

The encephaloid cancer may be mistaken for the benign adenoma or papilloma which occur quite frequently and are important because they are sometimes very difficult to diagnose and so frequently carcinomatous changes occur in the benign tumor if it is left or a cancer recurs when the apparently benign tumor has been removed. Benign growths are usually attached by pedicles, but even if they have broad bases they are never indurated. In as much as these tumors are so liable to contain malignant cells or to develop malignancy later, I never place much credence in laboratory findings of bits removed from the tumors, because part of the tumor may be benign and another part may be malignant. Benign fibrous stricture due to nonspecific ulceration and following long after some previous rectal trouble is the most difficult to differentiate. It is smooth and regular in contrast with the irregular, nodular and rough appearance of cancer. Of course, the history of the case is entirely different as the traumatic stricture produces no symptoms other than obstruction.

The congenital stricture is frequently unobserved until the af-

fectured child eats solid food and the stools are formed, but it is almost always recognized before puberty. The symptoms are those of obstruction in an otherwise healthy child, and of long standing, whereas carcinoma does not occur until adult life.

Syphilitic lesions in the rectum may be mistaken for cancer, particularly the encephaloid cancer. Chancres are very rare above the anorectal line. Mucous patches occur about the same time as the macular eruption on the skin. Both these lesions have a tendency, in ulcerating, to follow the blood vessels and lymphatics, so that the ulcer spreads upward rather than laterally. There is considerable discharge of that peculiar chancre smell. It is very different from carcinoma.

Gummata begins in the connective tissues and if seen early the mucous membrane is free above the tumor, which is round and elastic, and may be as large as an orange. Later it undergoes fatty degeneration and ulceration and the cicatrix may cause stricture.

In the proliferating proctitis fragile villous teats hang from the mucous membrane. There is an abundant discharge of muco-pus. The granulating mass is soft and its base is limited to the mucous membrane, but does not infiltrate below. The growth spreads all over the rectum and is not limited to one part.

Syphilitic stricture in the lower rectum can hardly be mistaken for cancer because the history is much more chronic, the infiltration is more diffuse and lacks the hard, nodular feel of carcinoma, and ulcers are more shallow, have smooth edges and finally the history of syphilis can usually be elicited. In any suspected syphilitic lesion the spirochaeta should be sought.

Acute or chronic colitis accompanied with hemorrhage and loss of weight and the usual spasm of the bowel may simulate cancer, but the bosselated inflamed mucous membrane covered with blood, mucus and pus as seen through the sigmoidoscope will clear up the diagnosis.

Tuberculosis is more difficult to differentiate especially if involving the anus, but there is usually evidence of tuberculosis in other parts of the body. It rarely causes obstruction as the infiltrating deposit ulcerates early and the ulcers are shallow with undermined edges. The tumor is small and is due to inflammatory exudates and the involving of the glands. Microscopically, tubercular inflammation and bacilli may be found.

Actinomycosis of the bowel must be thought of, although 60 percent of the cases of actinomycosis are confined to the neighborhood of the appendix and cecum and may closely simulate appendicitis (Lynch: *Disease of the Rectum and Colon*).

Among the less common conditions which, however, must occasionally be differentiated are traumatic stricture, which is felt as a dense, sharp, constricting ring and presents no symptoms other

than those due to obstruction; chronic appendicitis especially if the mass is located on the right side which an opening for operation will decide fecal impaction which lacks the infiltration and really has only the one symptom of obstruction; and finally extrarectal growth and inflammations which occlude the lumen of the bowel by pressure or involving the coats of the tube by extension. Cancerous growth of the sigmoid may be palpated through the abdomen often before it produces obstruction. Carcinoma may be mistaken by its symptoms for chronic dysentery, because of pain, tenesmus and blood and mucus stools, but careful digital and sigmoidoscopic examination with the assistance of the fluoroscope's screen or x-ray picture will clear up the condition.

Hypernephroma or prolapsed kidney may simulate a tumor of the bowel, but will be differentiated by finding blood in the urine and later by urethral catheterization. Hypernephroma tumor is behind the bowel thus affording a tympanic instead of a dull percussion note. The symptoms come on slowly with lumbar pain radiating to the abdomen and down the thigh.

In any of these cases where the diagnosis is doubtful and an exploratory laparotomy is made, the incision should be placed as for colostomy, so that if removal of the tumor is unwarranted, an artificial anus may be made at once.

This gives the reader a general picture of the clinical features of cancer as found in the lower part of the large bowel, and the object of this article is to set out prominently such symptoms as will assist in a clear and early comprehension of this dread disease. What course of treatment shall be adopted depends on many things; which of the symptoms are most prominent, the position and extent of the growth and the involvement of other and perhaps vitally necessary organs. Upon these the surgeon must decide whether his treatment shall be removal with a hope of lengthening life and perhaps curing the patient, or shall it be simply alleviation of suffering. If the entire mass and sufficient perirectal tissue can be removed, the prognosis is relatively good; but in advanced cases the prognosis is bad, regardless of the operation.

DIAGNOSIS OF TUBERCULOSIS IN WAR-TIMES—VALUE OF PHYSICAL SIGNS.

By JOHN B. HAWES, 2nd, Boston.

There is a vast difference, apparently, in the diagnosis of pulmonary tuberculosis in war times as compared with times of peace. In ordinary circumstances, in my own work at least, I should consider a careful and painstaking study of the patient's history, past and present, and of his symptoms, to be of far more value than whatever I could learn from the physical signs in the chest or elsewhere. In war time this is changed. Facts, so-called, elicited from the patient himself, as to what has happened in the past and as to how he feels at present, must be largely discounted. A small group of men, eager and anxious to enlist, will hide or cleverly disguise the truth. Another larger class will enlarge upon suspicious symptoms, or use their imagination to invent them. Therefore, in the diagnosis of pulmonary tuberculosis in war time, the information gained from physical signs is of paramount value.

Having come to this conclusion, which I believe is the only tenable one under the circumstances, what then are the physical signs or groups of signs on which a definite diagnosis may be based? I will consider these in the order in which they are placed in the Diagnostic Standards adapted by the National Tuberculosis Association for the purposes of the Framingham Experiment.

1. *Loss of Weight and Strength.*—In ordinary circumstances, these are important signs. The latter is largely subjective, however, and both—except in extreme and manifest cases—depend so much on the truthfulness and intelligence of the patient as to be of comparatively little importance.

2. *Fever and Rapid Pulse.*—Here again we are deprived of two of the most important points on which a diagnosis is usually based. A rapid pulse, taken under the stress and excitement of an examination of this kind, must be of little significance. Nor can the presence or absence of fever be determined by a single test. Therefore, except in suspicious cases who are reserved for further examination, and in whom a record of the temperature and pulse over a period of three or four days can be taken, I should be inclined to pay very little attention to a rapid pulse, or a fever under 100° F. Along with other signs, of course, a fever of over 100° F. is significant.

3. *Hemorrhage.*—This can hardly be considered a "physical sign," unless it occurs in the presence of the doctor, which practically never happens. A history of hemorrhage, if it can be confirmed—and this is a very big if—is naturally of very great importance,

4. *Cough and Sputum.*—The same objection to hemorrhage as of value in diagnosis in these circumstances applies to cough and sputum. If there is opportunity and time for sputum examinations—which I doubt is often the case—this should, of course, be done. Under ordinary circumstances, however, I should attach little value to the statement of any recruit that he “has a cough and raises sputum.”

5. *Hoarseness.*—I doubt if hoarseness is often faked, and even if it is, it ought to be easy to detect it. Persistent and evident hoarseness, therefore, particularly if associated with other signs, should be looked upon with suspicion and as requiring full investigation.

6. *Dulness.*—The presence of dulness alone, with the heart in normal position and in the absence of other signs, is certainly not enough on which to make even a provisional diagnosis.

7. *Altered Voice and Breath Sounds; Bronchial Breathing; Bronchophony; Egophony.*—Distinct and definite bronchial breathing, intense bronchial and whispered voice, egophony, etc., heard at the apices or bases, particularly if unilateral and persistent, I should consider of the greatest importance as evidence of an old and probably tuberculous lesion. Along with dulness and râles, a definite diagnosis is, of course, justified.

8. *Râles.*—Persistent râles, confined to a definite area, may not necessarily mean tuberculosis, especially if at the base of the lung. They are certainly very strong presumptive evidence of a tuberculous process, however. Such râles at one or both apices should certainly be looked upon as meaning pulmonary tuberculosis, and the patient should be debarred from service. I should view all râles with suspicion, requiring further and more detailed examination before the recruit could be definitely passed upon favorably. This does not necessarily mean that he should be stamped as a consumptive, however.

As I have often said elsewhere, the value of the physical signs, as here discussed, in making a diagnosis or in guiding one's actions in accepting or refusing any given candidate, depends less on the signs themselves than on the ability of the physician to interpret them properly. The most valuable asset of any physician doing this kind of work is not sharpness of vision or hearing, but common sense.

THE TREATMENT OF MORPHINISM BY THE REDUCTION PROCESS.

By C. B. PEARSON, M.D., Arlington, Md.

II. The Application of Psychotherapy.

All the seductiveness, cajolery, flattery, subtlety, deceit, treachery, cruelty and despotism, that the orthodox clergy of three or four generations ago ascribed to His Satanic Majesty can today be very aptly applied to his majesty, king Opium. I do not know a thing in the world about the devil, but I do know a few things about opium.

John Smith, after he has become an addict and remained one for about five years, more or less as the case may be, is not the John Smith that his friends and neighbors once knew. The subtle processes that bring about a change in the addict's identity are among the most baneful of the ill effects of the drug. The psychic damages wrought by the drug are more difficult to overcome than the physical damages.

It is always considered good therapeutics to remedy as far as possible the damage done by any disease. The psychic damages wrought by opium are not perhaps so tangible as a dislocated hip joint, but they are every whit as real, more deplorable, and more difficult to remedy.

The reader may be excused if he asks at this point if abstinence from the drug will not remove the psychic damages? It will. But abstinence from the drug is very difficult to secure by reduction without restraints unless the abnormal mental attitude of the addict is at least partially overcome during treatment. And inasmuch as the psychic damages done by the drug are not wholly overcome by abstinence for many months after the last dose, we can readily see how this abnormal mental attitude may be responsible for a relapse. We can also see the practical wisdom of attempting to influence this abnormal mental attitude in such a way that it will not be a menace to success either during the removal of the drug or during convalescence.

Practical psychotherapy consists in attempts to influence the mental attitude or the mental processes of the patient in such a way as to assist in bringing about a cure. I rely upon it in the management of morphinism not only as a curative agent but also as a substitute for force or surveillance. I cannot conceive of a successful application of psychotherapy in the treatment of morphinism by one who is ignorant of the addict and his ways.

One should know his doubts and fears, his peculiar mental tort, his characteristic obsessions, and those matters about which he is most sensitive. Especially should one know those features of the psychology that constitute the greatest menace to the successful management of these cases.

I will not burden the reader with an elaborate description of the mental and moral symptoms of morphinism. My title does not call for it. I cannot very well write an intelligible article without referring to at least some of the more prominent mental symptoms of this disease. And among these are secretiveness and cowardice. Both result from self-depreciation which is the keynote of the psychology of morphinism.

The addict is secretive because he imagines that others have as poor an opinion of him as he has of himself. He is cowardly because self-confidence is the very basis of all courage. When I say that the patient's morale is bad I mean precisely the same thing as our military friends mean when they say that the morale of the army has deteriorated. The cause in both cases is the same, *i. e.*, a lack of self-confidence. Admitting self-depreciation we need not take the trouble to explain why the addict is secretive. A case that I treated this last summer illustrates very forcibly how secretiveness becomes an almost insurmountable hindrance to a cure. This lady resided in Michigan in the neighborhood, where I was once engaged in general practice. For the past 7 years, I have sent her from time to time reprints of my articles. These she told me, when she finally came to me for treatment, that she would read over and over and finally lay them in a secret place where she had them all hidden as she supposed from the rest of the family. She further said that every time she read one of these articles she wished that she was at my place for treatment, but always felt that she amounted to *so little* that it was not worth while for her husband to spend any money upon her account.

The family on their part knew where these articles were hidden and unbeknown to the patient had also read them all. And they too devoutly wished that she might come to me for treatment, but knowing how sensitive (another pronounced symptoms of morphinism) she was, they did not want to offend her by mentioning the matter.

She had been an addict for 32 years and at last her health began to fail very rapidly. One day her daughter plucked up enough courage to say, "Mother, do you not think that it would be best for you to go to Dr. Pearson for treatment?" She said, "Yes, but," etc., etc. However, the ice was broken. The family took council together and sent her to me forthwith. Here we have seven years of misery and suffering on account of just one of the mental symptoms of morphinism.

I might write a whole volume upon this one theme of secretive-ness to show how it is one of the shackles that binds the addict to his addiction. Of course, there are other bonds. King opium is not content to bind his victims with one chain. He uses a multitude of chains. The reader has already seen how it hinders or delays many from taking treatment. It is one of the reasons why those institutions that promise a cure while you wait are so popular.

I had some correspondence with a nurse, who wished to take treatment. She finally took a three-day cure. In her correspondence while taking the drug ad libitum she wrote a fine, even hand. In a letter that she wrote me a month or so after taking this treatment the letters were illy formed and the words sprawled all over the page. This indicated well enough the state in which she was. The explanation she gave was, that while she thought my system of treatment was the more rational, she did not see how *she could account to her friends* for so long an absence. The reader may say at this point that the aforesaid nurse was a fool. Oh, no. Her conduct can be fully and completely explained by saying that it was the direct sequence of one of the psychic damages of morphine.

If failure was the only bad result of patronizing strictly commercial institutions, it would not be so bad. But after an addict has failed many times to secure permanent relief from his affliction failure itself becomes a habit.

I have thus far scored over 90 percent of permanent cures among those addicts who had never before taken treatment. I wish that I could say as much for my work with those who have already failed several times. My success among this class is less than 50 percent of permanent cures. The physical difficulties to be overcome in this class are not a whit greater than among those who have never before taken treatment. I did straighten up one patient who had before failed 35 times. This is a success that I may never again be able to duplicate.

Secretiveness hinders success by causing the addict to abridge his stay with me. The addict wishes to spend as little time as possible in taking treatment, because he fears that if he is away from home too long people will begin to make inquiries and thus learn that he is taking treatment for morphinism, and, of course, learn that he has been an addict. In many cases they have already been long aware of this fact. Again it often means a bar to success, because the addict slips away from home for treatment without making a confidant of those nearest and dearest to him. This is often the case with medical men, who come to me for treatment.

A doctor once came to me for treatment on four different occasions. The last time I asked him if he had confided in his wife. He said yes. I was practically certain that he was lying to me.

On this occasion I kept at him until I made him confess that he had not told his wife. His excuse was that it would mean his complete ruin if he told his wife. I said to him, "Doctor, if your wife is a woman worth having, instead of meaning your ruin it will mean your salvation." When a doctor puts up a bluff to his wife and those nearest to him that he is going away for postgraduate work, he is compelled to continue the deception when he returns home by at once going to work. Especially as these patients always look 100 percent better after they have been free from the drug a few days. This usually means relapse.

I took matters in my own hands and communicated with his wife and impressed upon her the necessity of her doing everything in her power to aid the doctor. On this occasion the doctor remained free from the drug until his death three years later. Secretiveness is a better gauge of the severity of morphinism than physical deterioration.

One cannot make any general statement in regard to morphinism to which there are not exceptions. Some addicts are not secretive. I successfully treated a lawyer from the south who was not the least secretive. One day while he was trying a case, the opposing counsel tried to break the testimony of his main witness, because the witness was an addict. He stepped out in front of the jury and said to them, "Gentlemen, the opposing counsel is trying to make you believe that my witness does not know what he is talking about because he takes morphine. Gentlemen, I am full of morphine this minute, and I know what I am talking about." He did. In spite of morphinism he had a very acute mind.

There is not one addict in a thousand who would do a thing like this for a thousand dollars and many would not do it for a million. This case well illustrates my contention that the physical difficulties are not hard to overcome. This particular patient weighed 125 lbs. when he came to me for treatment and was so weak that he could hardly walk. As soon as the surplus morphine was taken away he began to eat and gained 22 lbs. during the reduction of the drug. Now a year after the last dose he weighs 185 lbs. When he went home as he had never made a secret of his addiction, his entire community stood as a moral support behind him for they all wanted to see him make good. We have but little conception of the power of a psychic force of this kind. There can be little doubt but that the force of it swept this patient along to victory. The physical difficulties have never been responsible for a single failure, during the years that I have been engaged in this work.

Nearly all addicts feel sure that if the physical craving for the drug could be overcome that they would be sure to make good. I wish such were the case. Secretiveness has scored more failures

against me than any one thing. The normal reader I think will see and admit the reasonableness of what I have said about secretiveness. Some of the addicts who may happen to read this article may become very angry with me. Now that we have I believe established the fact that secretiveness is one of the psychic damages that may make for the continued enslavement of the addict, what are we going to do about it?

I rely chiefly upon repeated suggestion. It will not do one particle of good to let the patient know what I think about the matter. The thing to be done is to get the addict to voluntarily think about the matter as I do. There is a great difference between the two. It is too much to expect that you can ever bring the addict to make a confidant of his entire community, although the harm that would follow such action is wholly imaginary on the part of the addict. We are wont to say that this is a wicked world. I have found, however, that people are on the whole better than we in the habit of giving them credit of being. I feel that I can confidently make the assertion that at least 99 percent of the people in any community throughout the length and breadth of this great country of ours would be glad to see any addict within its midst make good. While I believe this to be absolutely true it is not wise to attempt too much along these lines with the addict. I am satisfied if I can remove enough of his secretiveness to achieve success. The idea that I try to plant in the addict's mind is that secretiveness is pathological. No one relishes the thought that morphine or anything else is doing something to his brain. I keep hammering away a little each day, until I get the patient doubting as to whether his position is the correct one or not.

When you get a patient to the point of doubting you have an entering wedge. Keep hammering away at the wedge until you pry the patient completely loose from his obsession. For secretiveness is an obsession. That is, instead of the patient holding certain ideas along this line he himself is firmly held by these ideas. I have already hinted that I do not always succeed. Sometimes the patient relapses and returns. As soon as he gets in the house I at once renew the battle. I have been able to score complete success after four failures.

Some physicians seem to think that we should not be accorded more than one attempt to cure these people. This is an absurdity. I have as much right to make repeated attempts to cure my patients as you, dear reader, have to make repeated attempts to cure your syphilitics. In addition to trying to get the addict to feel that secretiveness is pathological, I try to get him to perceive its manifold disadvantages and on the other hand the good that will be done by getting rid of it.

When an addict throws secretiveness to the winds he burns his

bridges behind him and he will be compelled to make good whether he wants to or not. However, I wish the addict to do this of his own accord. The case that I have mentioned where I communicated with the patient's wife is the only time that I have seen fit to take matters in my own hands. One of the reasons why the addict cannot rid himself of secretiveness is because the drug makes a coward of him. I have seen a few addicts (very few) who retained their physical courage. I have yet to see one who did not become a moral coward to a greater or less degree. If secretiveness is a bar to success cowardice is a twin brother to it in this regard.

Let me repeat secretiveness is one of the many bonds by which king Opium holds his victims in his power because it hinders the addict from taking council with, or asking the assistance of, his friends, and thus hinders him from making the initial attempt to secure his freedom. And he dreads to devote the proper time to treatment and convalescence for fear that this will reveal his past addiction to the drug.

Cowardice is another bond that binds the addict to his slavery, although it works in a different way. It also hinders the addict from making the initial attempt at recovery. It is the principle motive for not playing the game on the square when the addict does make an attempt at treatment. It is not an obsession, it is a condition of deteriorated virility and morale. A lack of self-confidence is sufficient to explain it. I am inclined to think that there are more profound and more deep-seated reasons for its existence than would appear upon the surface. We know that the drug interferes and in some cases wholly arrests the secretions from the testicles and that menstruation is stopped. Whether or not there is some connection between this lowered sexual tone and as happens in many cases the total arrest of sexual function and the opium-induced cowardice, I do not know.

There are many who think that in morphinism there is an interference with the secretions of the ductless glands of the body. It may be that the normal action of these glands has something to do with courage. There are many problems of morphinism that await solution.

But, however it comes about the addict is generally a coward, both physically and morally. It is equally certain that this cowardice is one of the obstacles to success in bringing about a cure. Left to itself it is a greater bar to success than is the case with secretiveness. Fortunately it is easier to manage with. For its relief we can use both suggestion and tact. We do not have to wage battle against a stubborn obsession. All we need to do in many instances is to divert the patient's attention.

Inasmuch as the addict's mind drifts naturally from first one thing to another, this is not a difficult thing to do. The worst

about it is that it demands a great deal of your time. Some patients are inclined to get away by themselves and sulk when they are discouraged. It is an advantage to have others about the place who are familiar with the ways of these people, so that when they see that one is acting badly they can report the matter and give the physician a chance to remedy it. I have seen these cases away down in the dumps and then have seen them laughing and joking in less than an hour as though they had not a care in the world. Sometimes when you see that a patient's courage is failing all you have to do is to approach him and say very seriously to him that you are very much pleased with his conduct and that you are delighted to see that he is making a very brave fight indeed. This swells him all up with pride and he forgets that he ever had any such thing as the blues. But they are like the foolish Galatians that Saint Paul told us about, "they weary in well doing." So one has to bolster them up constantly, jolly them up, flatter them up, deceive them up, and sometimes cuss them up, just anyway at all to keep them encouraged and fighting the good fight at all times.

I said in my last article that I considered it good therapeutics to keep the patient comfortable at all times. And that the proper management of the reduction contributed to this end. Here we have a chance to minister to the patient's comfort to an even greater degree. For fright and panic will neutralize morphine even more effectually than pain. Cowardice is one of the psychic damages of the drug. And it is certainly good therapeutics to correct this as far as lies in our power. I believe that the management of these cases without restraints contributes towards this end.

I not only tell my patients that they *can* play the game on the square, but *I make them think that they can*. There are a great many different forms of suggestion. It is hardly necessary to tell the reader that suggestion can do harm as well as do good. When you lock a patient up, to my mind you make use of a harmful form of suggestion. For what conclusion can the addict gather from the fact that he is locked up except that he is an incompetent weakling who can not be trusted? It will take a great deal of kindness and tact on the part of operator to overcome this bad impression if he is able to do so at all.

The patients exercise harmful suggestion upon one another unless you watch them and prevent it. The old rounders who have failed many times are often fond of quoting the dictum of a noted German professor who said that "only 3 percent ever made good." I will not permit any such pessimistic talk to go unchallenged. It is not only harmful but it is absolutely false teaching. If I get a patient who is incorrigible in spreading pessimistic ideas I feel justified in discontinuing his treatment. First I take him in hand and try to cure him of his pessimism. Usually I succeed.

Mere earnestness of purpose is a psychic force of no mean magnitude. My patients very soon get the idea that I expect that they can go down the line on the square and get past the craving for the drug, but also that I expect that they will and can make good after they leave me. I never say to my patients when they are about to leave that I have done my part, you are past craving for the drug and you can stay well if you choose to do so, but I expect you will be foolish enough to get to drinking or that you commence to dabble with paragoric and then morphine. I have cured you, but I cannot give you brains, etc., etc.

The reader has already observed that I recognize certain psychic damages that are done by opium. If I recognize these damages, then it is as much my duty to correct them as far as lies in my power and to put the patient into a normal way of thinking as it is for the surgeon to properly dress and adjust a fractured bone.

The pessimism of the patient should be overcome by a powerful optimism. Not a foolish optimism, but an optimism that recognizes all the obstacles to success and all the dangers that may beset the path of the convalescent. An optimism that knows how all these obstacles may be overcome and how all the dangers may be prevented. Some little tact is required to manage the hypersensitiveness of these people. I have said that self-depreciation is the keynote of the psychology of morphinism. Now just because the addict has none too good an opinion of himself, he is for this very reason morbidly sensitive as regards the opinions of others. Sometimes this hypersensitiveness degenerates into morbid suspicion and even in some cases especially mixed case (morphine and other drugs and whiskey) becomes mild delusions of persecutions. For these reasons I always treat my patients with studied respect. It is not only easier to get along with them in this way, but it does something towards restoring their deteriorated morale.

The patient is morbidly sensitive as regards his own condition. However, he has a much keener perception as regards the condition of the others. He seems to think something like this, "I am pretty far gone myself, but I am not so bad off as the rest of this bunch. Why, some of them are actually nutty."

A man and his wife came to me for treatment some years ago. After a day or so the wife came to me and said, "you will have to watch John pretty closely, his mind is very weak." A day or two later the husband came to me and said, "Mary's mind is very weak and you will have to watch her very closely." Both gave very excellent and timely advice. Addicts under treatment are very prone to be envious and jealous of each other. Knowing this I try to be very circumspect and impartial in my relations with them all.

Under no circumstances should an addict be ridiculed or treated with contempt. Some of the mental and moral manifestations of

the addict under treatment are not as agreeable as they might be. However, these things constitute a part of the symptoms of the disease. No man should be berated because he is sick. Neither the appearance nor the odor of a confluent case of smallpox is agreeable. We would not berate the smallpox case on this account. In the one case the symptoms manifested are physical and in the other they are psychic. This is all the difference that there is.

One should never compare the addict with or weigh him in the balance with the normal man. A knowledge of their ways enables one to discount the disagreeable features in advance. It is well to give them considerable latitude. We should also remember that the insane are made to mind. The good of each individual patient demands that we establish certain metes and bounds to their conduct while they are under our care.

Many addicts are obsessed with the idea that life cannot be lived comfortably by them without morphine. This is a genuine obsession and one that is difficult to remove. As a matter of fact the very opposite is the truth. For no one can live comfortably and be at the same time deep in morphine. Some have told me that they could. But I know better. We need not be surprised that the addict should have this obsession. It is an abnormality, of course. However, the addict came by it in a perfectly rational manner. His experience has been for the past 10 or 20 years as the case may be that he has been very decidedly uncomfortable whenever he has tried to do without it or even when he has tried to cut down the dose to any considerable extent. We can sympathize with this idea. When the addict tells us that he is feeling fine he intends no deception. No one can take morphine for 20 years and remember anything at all what real health feels like. However much we may sympathize with this obsession we must remember that it is pathological. And that it is something to be overcome. If it is not overcome it constitutes a predisposing cause of relapse. Various forms of suggestion may be used. It is a stubborn obsession and it will mean a prolonged battle, that must be continued day after day for a long time.

In conclusion I wish to say that while accuracy of dosage and smoothness in the reduction make for the patient's comfort, the comfort and well being of the patient can be greatly enhanced by attention to the psychotherapeutic end of it and also by attending to the ordinary therapeutics of morphinism, *i. e.*, medication, diet, rest, exercise, etc.

The latter I shall discuss in my next article.

GASTROENTEROSTOMY—THE STOMA AND THE EFFERENT LOOP.*

By W. HOWARD BARBER, M.D., New York.

The simple suturing of a loop of small intestine to the stomach without any particular regard for the location or direction of the stoma or for the disposition of the efferent loop may, under certain conditions, accomplish approximately normal gastric emptying. When the pylorospasm disappears, or after the gastric tonus has improved, the stoma may appear functionless. This "interval" functioning may be all that is desired; if it is, almost any gastric opening into the cephalad small gut should suffice. Occasionally the pathological changes are permanent or of increasing severity, so that continued stoma efficiency is required; the position of the stoma, the direction of the stoma, and the peristaltic type of the gastroenteric anastomosis will then be important considerations.

It is conceivable that many mucous erosions of the pyloric portion of the stomach and of the duodenum are of the former type. The accompanying pylorospasm protects the ulcer site and encourages, possibly by increased intragastric pressure, the passage of the stomach contents out of the new opening. Should there be much induration or retardative adhesions or malignancy under conditions that indicate gastroenterostomy, it is probable that a properly placed stoma joined to an isoperistaltic loop of proximal jejunum will, in the majority of instances, be associated with the greatest degree of postoperative comfort.

It is helpful to consider the stoma and loop from an anatomical as well as from the physiological point of view. Consider, especially, the following:

The ". . . proper site for the gastric incision . . . is on a line with the longitudinal part of the lesser curvature, with its lower end at the bottom of the stomach (under the cardiac orifice)."¹ He finally advises that the efferent loop of the jejunum be directed from right to left.

"When the ulcer is at the pylorus or in the duodenum, I make the opening between the jejunum and the stomach, as near the pylorus as possible," and "three inches of the first part of the jejunum are temporarily fixed to the posterior wall by my catch forceps in such a direction that the proximal part of the intestinal loop points to the cardiac end and lesser curvature." Later, "I

*From the Department of Surgery, New York University and Bellevue Hospital Medical College.

now make the anastomosis from the lesser curvature to the greater across the pylorus, and turn the jejunum toward the left.”²

The gastric stoma is made “. . . in line with the right margin of the esophagus, and it ends below at the lowest point of the greater curvature.”³ He further remarks that the opening in the



DILATATION OF STOMACH.

Fig. 1.—Dilated stomach, with symptoms covering two decades substantially unrelieved medically or by a surgical suspension, cured symptomatically by posterior gastroenterostomy with a transverse “pendant” stoma. Cf. similar experience recorded by Mayo-Robson in *Surgery* (Keen, W. W.), 1909, III, pp. 892, 947. This illustration is taken from a previous publication of the author in the *Medical Record*, May 1, 1915, p. 10.

stomach should be vertical and the efferent loop should be straight downward.

“. . . In cases of marked stenosis or closure of the pylorus every method answers the purpose. . . . It is a good plan to make the opening in the stomach at right angles to the greater

curvature." The jejunum should be placed in the direction of the long axis of the stomach.

Observe that according to these opinions the ideal gastric stoma is vertical or perpendicular, that it is located in the distal fundic portion or as near the anatomical pylorus as possible, and that the efferent jejunal loop is directed straight downward—downward and to the left or downward and to the right. Obviously the direction of the loop naturally coincides with that of the gastric stoma. If the stoma is in line with the vertically descending arm of the lesser curvature, the jejunal loop will be directed straight downward; if the opening is obliquely downward and to the left, the loop takes the same direction; or if the line of the anastomosis is within the pyloric part and actually perpendicular to the greater curvature, the efferent loop must be directed downward and to the right. The disposition of the jejunal loop is a relatively unimportant one, being, as it appears, dependent on the position and direction of the stoma. Substantially, the proposition is, shall the gastric stoma be juxtapyloric or pendent and perpendicular, vertical, or directed from above downward and to the left.

Clinically, gastric function is difficult to study directly. Spontaneous cases have presented themselves after gastrostomies that lend themselves favorably to isolated observations. Fluoroscopically, some evidence is obtainable. In many respects, for surgical purposes at least, experimentation upon the mammalian stomach is most satisfactory. The animal is fed a beef bouillon and cracker meal, a hypodermic of morphine is given him, and from 15 to 30 minutes later he is slowly etherized by the drop method of induction. With the animal lightly under the general anesthetic, laparotomy is performed and the stomach's activity is directly observed for a period of from one to four hours. Similarly, in the course of human operations, one notices actively, often forcibly, contracting stomachs. Under these conditions peristaltic waves are seen which are apparently identical with those observed fluoroscopically or with the oscillations of intragastric pressure. They recur at 15 to 25-second intervals, are generally regular, forcible, and complete peristaltic waves. By keeping constant the anesthesia, instrumentation, and handling, it is possible to make one, two, or three openings in the stomach and to note the respective effects upon the gastric cycles. It is also possible to observe the effects of the peristaltic waves upon the stoma and the efferent jejunal loop.

Effect of the Stoma Upon the Gastric Wave.—From a limited number of experiments it appears that the gastric peristalsis continues, with slight interruption, after stomata have been placed in the proximal fundic, middle fundic, or in the pyloric portions of the stomach, or after all three openings have been made. Each wave approaches the immediate vicinity of the stoma, disappears,

and appears again close to the far side of the stoma-bearing area, whence it continues to the pylorus. This area of no contraction varies with the lateral extensions of the stoma; it is greater for the transverse than for the vertical opening. In other words, these stomata placed along the greater curvature of the stomach



Fig. 2.—Reproduction of cast of normal stomach and duodenum to show the normal relations of stomach, duodenum, and duodeno-jejunal flexure. Half normal size. Note extent of duodenal circumference, height of flexure from which jejunum swings horizontally to left, and compare with Fig. 3. This drawing was carefully made from a human casting in the possession of Prof. Senior, and is believed to represent accurately the normal relations of stomach, duodenum, and duodeno-jejunal flexure.

cause relative insufficiencies of the stomach wall, while the peristaltic activity of the stomach as a whole continues with about the same regularity, rate, and direction. The force of the peristaltic wave is impaired most with the transverse and least with

the vertical stoma. The stoma high on the greater curvature of the fundic portion appears to interfere least, the opening at the middle of the fundus more, and that in the pyloric antrum most with the force of the peristaltic wave. It appears true that the mid-fundic, transverse stoma gives a marked disturbance in the force of the wave and paralyzes a considerable portion of the gastric musculature, and that a pyloric, vertical opening impairs relatively less of the total or regional contractile power of the stomach.

Effect of the Wave Upon the Stoma.—The contents of the stomach are squeezed out of the stomach opening wherever it may be during forcible respirations and peristaltic contractions. The chyme appears to gravitate from the upper and middle fundic openings, and

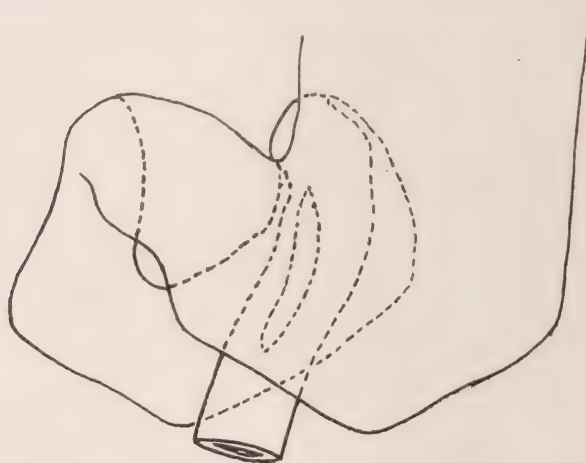


Fig. 3.—Diagrammatic representation of a gastroenterostomy with a perpendicular stoma and a downward-directed efferent jejunal loop. Adapted from human cast. Half normal size.

to be propelled from the pyloric and occasionally from the mid-fundic stomata.

Effect of the Wave Upon the Efferent Jejunal Loop.—It is observed that the direction of the ejecta from the pyloric opening of a stomach working under ideal conditions coincides with the direction of the stomach's drive—namely, from left to right. This applies particularly to vertical pyloric and occasionally to mid-fundic stomata. In one instance a proximal loop of duodenum was found choked with gastric contents following a pyloric exclusion and a heteroperistaltic anastomosis between the jejunum and the pyloric antrum. On this basis it is probable that some of the immediate untoward symptoms following gastroenterostomy are explainable. It seems reasonable to believe that a union of the small gut with the stomach that throws the efferent jejunal loop downward or downward and to the right, which is

a position that throws the gastric-emptying peristalsis in line with the jejunal-continuing peristalsis, will carry off the greatest amount of the chyme in the shortest time.

SCHEME OF EMPTYING FROM GASTRIC STOMATA OF NORMAL STOMACHS.

Vertical type of stoma— experiment No.	Located in		
	Proximal fundus	Mid. fundus	Pyloric part
176	plus	plus	plus plus
183	plus	plus	plus plus
193	?	plus	O
Horizontal type of stoma			
177	?	O	
182	plus	plus plus	plus plus plus
188	?	O	O
190	plus	plus	plus plus plus

"Plus" indicates the bulk of material and not the force of its ejection from the stomach. Drainage rather than emptying applies to the horizontal fundic stomata.

COMPARATIVE EMPTYING PERCENTAGES FROM STOMATA OF ARTIFICIALLY DILATED STOMACHS.

Experiment No.	Das. postoperative	Percentage emptying from	
170 ⁵	35	Antral stoma, 31	pylorus, 69
113 ⁵	30	"Pendant" stoma, 88	pylorus, 12

On the basis of the experimental data presented, and on its clinical application to date, the following recommendations are offered:

1. "For normal or hypertrophied stomachs, the nearer the artificial stoma coincides with the physiologic point of outlet, the greater is the efficiency of the stoma."⁵ The stoma should be a perpendicular one.

2. For stomachs dilated beyond apparent hope of regeneration, the transverse, mid-fundic stoma seems most efficient.

3. For moderately dilated stomachs or stomachs in which an appreciable return of original tonus may be expected, a perpendicular antral stoma seems most efficient.

4. Whenever possible, the jejunum should be so chosen that the portion to be anastomosed falls naturally along the line of the proposed gastric opening. Excepting in atonic stomachs,² in most instances the course of the efferent loop will be downward or downward and to the right.

TECHNIC OF GASTRO-ENTEROSTOMY.

Open the lesser sac and push the mesocolon off from the posterior surface of the pyloric part and toward the pyloric sphincter. In

this manner the ascending and horizontal limbs of the duodenum with the superior mesenteric and midcolic vessels, are left dorsal and undisturbed. With little effort the antrum underlying the vertical arm of the lesser curvature is exposed. This normally measures two or more inches perpendicularly from the greater curvature to the junction of the vertical and horizontal divisions of the lesser border of the stomach. Such a line of incision opens the stomach terminally, making it possible to create a kind of termino-lateral union with the jejunum. The jejunal loop as near the duodeno-jejunal flexure as feasible is chosen; its efferent loop is thrown in the direction of the long axis of the stomach—straight downward or downward and to the right.

The horizontal position of the first part of the jejunum depicted under normal conditions in the accompanying drawing is, at any event, necessarily changed. In this instance, it is made a downward one. The pathologic physiology of this new gastroenteric relationship is represented in the above recorded observations.

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APPLICATION OF THE FACTORS CONTROLLING CARRIERS OF COMMUNICABLE DISEASES.

BY D. M. LEWIS, M.D., New Haven, Connecticut.

I have shown that it is possible to control those communicable diseases in which we have an accurate knowledge concerning the carriers. From the knowledge gained as to how the carriers are made and how they are continued as such, I am prepared to show that most if not all of the problems of disease incidence of the past and present may be readily elucidated. These factors controlling carriers have been found by the same kind of investigation that one learned to apply to internal medicine under Dr. Wm. Osler. Through the three basic fundamentals—seeing, feeling, and hearing—one may, with experience, become a skilled detective. With collateral reading of the past and present-day literature added, one becomes an expert. While at basis this had for years been applied to epidemic investigations of typhoid fever, it has not been thoroughly applied to other communicable diseases.

Applying our fundamentals to diphtheria, it may be found that a certain percent of those who have had the disease, because of nasopharyngeal deformity are found at certain times to be exhibiting the specific germ laden nasal discharge. We have learned that *such a deformity is a factor* in determining a later carrier development. The “certain times” are always those of acute nasopharyngitis or acute tonsillitis. Experience shows that among the contacts, whether family or neighborhood, there may be found similar nasal carriers dating the appearance of the discharge after the condition arises in the former individual. Observation and history gives the data that this second carrier not only has a similar chronic catarrhal condition or deformity, but that whether infant or older child, it is always picking its nose or scratching its skin. Again we find that the condition appeared shortly after a tonsillectomy or an adenectomy. In isolated cases trauma has been the factor. This second carrier has never had the disease. *One factor in making a carrier is then nasopharyngeal obstruction of any degree and injury.* As one reviews any 100 carriers, one finds a predominance of Italians and Jews. Attempts to pass nasal swabs on all races in the presence of the parent demonstrates both from the point of view of parent and child that alone of all races the two mentioned actually fear to keep noses clean. In reverse one will find that of all races the negro alone is most particular to do so. I have yet to find a true nasal carrier in the negro race. *Race is then a fac-*

tor, and one of some importance as I shall show later. A canvas of any number of crowds of children during latter spring, after say two months of sunshine, may result in finding no carriers. Let there then ensue a week of absence of sunshine, a time of chill rains. Examination of the same districts during the ensuing period of pleasant weather will be rewarded by a number of specific nasal discharge carriers. *Climatic conditions are a very real factor.* Although one may year after year explode the theory that the disease is one of tenement houses by showing that but one-third of the cases come from houses with more than two families resident, yet experience shows that whether two-family house or greater, we shall generally find the case on the top floor while the carrier is on the ground floor. Dampness and lack of sunshine is a factor. Should our case be in the better residential district, our carrier will generally be found among the case's known contacts in the less well kept house. *Carelessness is a factor*, though not necessarily a concomitant of race.

If now we take these various factors which determine the making and the holding of one a carrier of diphtheria or causing their reappearance as one, we may explain the frequency of the disease as to age, race, housing conditions, and seasons. The so-called cyclic frequency induced by measles and other similar infections, like the grippe, is rationally explained. We know why certain portions of this country may only at certain times have any incidence. We know how infection travels along the highway routes.

I have shown that measures built up around the carrier may control the disease, as has ever been expected from measures built up around the case. If now a step further is taken and measures are built up *around the various factors causing carriers*, the responsibility for sporadic incidence only may be shown to lie as exactly as has been expected from milk epidemics, with one party only, namely health departments. That the disease is shockingly frequent, that the deaths are disproportionate to cases for the reason that antitoxin is not used early enough, that health departments cannot rise above the level of the lowest intelligence of its citizens, all health educational propaganda from the office, is no longer tenable. Public health education from the office relates only to the careful intelligent. The careless intelligent and the careless ignorant can and must be protected from themselves by direct unceasing oversight of health departments. With lives saved only, all expenditures are justified. With definite demonstrable lessened family illness comes lessened alcohol, cleaner houses because of cleaner children, in a word increased family working efficiency. We should replace written educational pamphlets with direct teaching by practical demonstration. The new Public Health may be but the old Public Health pulling, not pushing the cart.

As definite as are the results of investigation of diphtheria, so definite are the explanations of its previous mysteries and so definite is the mode of subduing the disease. Yet it does not lie within the power of man to blot out the disease, because of the very factor I have mentioned. Because it can be subdued, similar study should be made of all communicable diseases. How very exact a measure of similar combat would be in our power had a recent investigation on pneumonia with its demonstration of carriers been carried from the laboratory to the field. The pathological and historical pictures of those carriers and the factors causing them would have unfolded a line of attack against carriers which would make treatment of cases insignificant. Such investigation would prevent metropolitan boards of health standing sponsor for investigation of an epidemic disease in terms of old worn out theories. Epidemics of unknown origin should be started from where the last left off, if the mysteries are to be revealed. The competent detective had the data of race, age, and housing conditions. Personally the snap diagnosis from those factors as meaning nasal carriers, not insects or animals, would have been all sufficient for a lead had I not at the time had the same lead given me by a study of the situation as I have outlined for diphtheria. I know that I can make diphtheria so uncommon that those physicians who use antitoxin only as a last resort will never see a case; I know that I can find every case, however sporadic, before it is too late to give antitoxin. The same should be possible for all our communicable diseases.

PUBLIC HEALTH PROBLEMS OF A SMALL COMMUNITY.

By J. NIEMACK, M.D., Charles City, Iowa.

The American health officer of the West is still a being of very doubtful usefulness and still smaller pay, whose main duty it seems to be to act as "the goat" in our ever recurring epidemics.

The laws about quarantine, notification, etc., are of course everywhere "enforced" just like the laws against bootlegging, and the result is about just the same; not quite negative, but not efficient either. It is for this reason, that I beg your leave to tell you how we have accomplished something in Charles City, Iowa.

Ours is a town of about 8,000 people: a large ammunition factory brings a good deal of fluctuation into our retired farmer and business population. Boarding and rooming houses are often overcrowded and into these places the newcomer carries his smallpox or diphtheria infection.

Eight years ago I was first elected health officer without salary. In all these years we have had no epidemic. And the reason is, that in every case we succeeded in getting a good hold of the first, or certainly of the second crop of infections.

Our local physicians are just like the rest, not over-anxious to make a diagnosis *f. i.* of smallpox, as long as there is any doubt. To do so would, at the first mistake, work disastrously for one's business and reputation. But, while the physician waits for his diagnosis to become reasonably certain, the community is subject to one continuous contamination.

It is this point on which we set in our machinery. The Board of Health appointed mayor and health officer a committee to deal with infectious diseases. All physicians were notified, that in every suspicious case they could have, free of charge to the patient, consultation with the Board's physician. If they neglect to take advantage of this, they are themselves responsible for results.

As soon as one case of contagious disease is diagnosed, all physicians are notified that such and such disease is in town, and warned to be on the lookout for it. If the physician having charge of the primary case has failed to recognize and notify it, the circular letter begins with the words: "Unfortunately one of us has failed in his duty, etc."

I am glad to say that the physicians as a body have supported this plan, and it is owing to their insistence, that I am still kept in this office against my will. They will tell the patient: "This is a peculiar case, I want consultation with the Health Board's

physician; that will cost you nothing." The health officer comes at once, examines, says: "This is smallpox; you will have to be quarantined and the rest of the household and all with whom you have associated, must choose between being vaccinated or quarantined." Vaccination to be done by their own doctor, and the certificate shown to the police. The vaccinated ones are kept under surveillance, but not locked up.

As this way of procedure causes only small expense to the city, and is a great convenience for the physician, it works well. Not that the health officer could not make a faulty diagnosis; but his is the "official" one which sets in motion the law's machinery.

In only three cases during eight years it has been necessary, to call a negligent doctor before the Board and apply a rebuke. In one class of our public school there was one death from diphtheria, two were sick but recovered, and about twenty were carriers. So the Board gave orders, that every case of "sore throat" should be bacteriologically examined. This a physician refused to do, when the "teacher" came under his care. At her resuming her school duties, I got a swab and a positive diagnosis from her. She proved to be a "carrier," and it took months, before her throat cleared up. But her removal from the classroom at once has ended the imminent danger.

A second doctor made the diagnosis of "meningitis," when a baby died from bowel trouble. He could not explain to the Board how he could know about the non-infectious character of the meningitis and gave promise not to make such diagnosis in future without spinal puncture.

A third one had treated a man for a week for "intoxication," before a consultant resorted to lumbar puncture and cleared up the diagnosis as "epidemic cerebrospinal meningitis." As the case of "chronic drunk" in the Y. M. C. A. had been widely talked about, there may have been some psychological reason for failing to report it in its true character. Anyway two more cases resulted from it.

In all three cases no fines were needed; the physicians in question realized how important the thing was for public health, and promised to be more considerate in future.

A community such as I described to be for eight years free from epidemics, in spite of continuous import of contagion from outside, means efficient protective organization. And to suggest our Charles City way as one of many possible ones, is the only justification for writing these lines.

BOOK REVIEWS.

THE PHYSICIAN'S VISITING LIST FOR 1918 (Lindsay & Blakiston's). Sixty-seventh year of its publication. Philadelphia: F. Blakiston's Son & Co.

This visiting list requires no description. As usually, it is published in various styles, either for 25 patients or 59 or more patients a day in a single volume, or two volumes for the year.

A MANUAL OF PHARMACOLOGY AND ITS APPLICATIONS TO THERAPEUTICS AND TOXICOLOGY. By Torald Sollmann, M.D., Professor of Pharmacology and Materia Medica in the School of Medicine of Western Reserve University. Illustrated. Philadelphia and London: W. B. Saunders Company. Price, cloth, \$4.50.

A LABORATORY GUIDE IN PHARMACOLOGY. By Torald Sollmann, M.D., Professor of Pharmacology and Materia Medica in the School of Medicine of Western Reserve University, Cleveland. Illustrated. Philadelphia and London: W. B. Saunders Company. Price, cloth, \$2.50.

These two works form a whole, the smaller member of the pair constitutes a practical guide to the science inculcated in its larger companion. The delay in reviewing these works has afforded an opportunity of putting their real usefulness to a thorough test as an exposition of systematic pharmacology, as a reference work to its present condition, as a guide to the literature, and as a handbook in the laboratory. In all these respects these two books have admirably answered the calls made on them. There is no risk in saying that they constitute the best work on the subject of pharmacology that has been published in the English language. The Manual can scarcely be regarded as a volume to be recommended to medical students for the systematic study of the subject. They would be better advised to read a smaller work for the general course and to read the more important parts only in Sollmann's. The whole subject of Pharmacology is treated with a sobriety and impartiality characteristic of the author. Professor Sollmann, as a loyal adherent of the Council on Pharmacy and Chemistry, has disfigured his work with all the absurdities of orthography affected by that body, and writes, for instance, chlorid (e) as though it rhymed with florid. In conclusion this is a work which will not be absent from the shelf of any pharmacologist and should be close at hand for instant reference in the office of every therapist.

HANDBOOK OF ANATOMY. By James K. Young, M.D., F.A.C.S., Professor of Orthopedic Surgery, University of Pennsylvania. Fifth edition, with 145 engravings. Philadelphia: F. A. Davis Company. Price, cloth, \$2.

This well-known handbook, which finds its true usefulness as an analytical index to larger works, and as a final review and refresher in the subject of human anatomy, has been developed and improved, while being kept within the bounds of a portable volume. A chapter devoted to Dental Anatomy by Dr. Appleton of the University of Pennsylvania, adds greatly to the work, as does also the incorporation of the Basle nomenclature which is used side by side with the names more familiar to an older generation. The book is so well known that it does not require a detailed review.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

FEBRUARY, 1918.

No. 2

EDITORIAL.

THE TREATMENT OF ACNE AND FURUNCULOSIS BY TIN.

The specificity of antiseptics—that is, the selective action of each antiseptic on certain organisms—was emphasized in a Collective Abstract published in the issue of the INTERSTATE for September last, and it was there prophesied that in this direction lay the road of advance.

This phenomenon has received what appears to be a really fruitful application at the hands of Frouin and Grégoire. These workers have shown, by experiments *in vitro*, that metallic tin, or the oxide of that metal, is specifically capable of inhibiting the *anaerobic* growth of staphylococci. While it has no antiseptic power against staphylococci growing aerobically, tin does notably attenuate the virulence of the organism in such conditions.

These results, fortified by the observation that furunculosis was unknown among the tin-workers of Beauce, encouraged Frouin and his collaborator to test the therapeutic value of tin in staphylococcic infections. Brilliant results have been reported from France by the originators of the method and also by several other observers. The product used, named stannoxyl, is a mixture of tin and oxide of tin, free from lead. The drug is usually employed in the compressed form usually called "tablets," though not even remotely resembling a tablet. The mode of administration is by the mouth.

In *The Lancet* for January 19 last, Captain Compton, of the Dorset (England) Military Bacteriological Laboratory, and formerly of the Institut Pasteur, reports the very favorable results obtained in seven cases of staphylococcic infections. Five of these cases were furunculosis, one was acne, the seventh was an infective dermatitis. These reports are amply sufficient to justify an extended trial of the method.

ROSENOW'S ANTIPOLIOMYELITIC SERUM TESTED UNDER EXPERIMENTAL CONDITIONS FAILS TO JUSTIFY.

In *The Journal of Experimental Medicine* for the current month Amoss and Eberson report the results of a series of experiments, on monkeys, designed to test the validity of the therapeutic claims made for Rosenow's antipoliomyelitic serum. The latter, it will be remembered, was prepared by injecting a horse with cultures of the streptococci derived from poliomyelitic nervous organs.

Now it is known that the serum of convalescent and of recovered monkeys is capable of protecting a control animal from the otherwise fatal effect of an intravenous injection of poliomyelitis virus; otherwise fatal, that is to say, if the experimental animal be suitably prepared. For it has been shown¹ that, although a minute dose of virus of poliomyelitis injected intracerebrally into monkeys is capable of causing paralysis and even death, a dose many times larger, injected intravenously, is without effect. But, if the animal receives at the same time as the virus, or previously, an intraspinal injection of a substance capable of setting up a chemical inflammation of the meninges, the characteristic symptoms of the poliomyelitic infection occur. Among such irritant substances are *sterile normal horse serum*, monkey serum, and even physiologic salt solution.

Flexner and Amoss found that the serum of a monkey convalescent or recovered from poliomyelitis, when injected intraspinally into a second animal was capable of protecting the latter from the effects of a previous injection of horse serum and of virus, intraspinal and intravenous respectively.

The results obtained by this method are so sharp and unequivocal that it was considered peculiarly suitable for testing the probable therapeutic value of a serum, such as Rosenow's or Nuzum's, reputed to be efficacious in human antipoliomyelitis.

Two separate sets of experiments were made on seven monkeys, and the results, which were decisive, are recorded in detail in Amoss and Eberson's article. Control animals and animals treated with Rosenow's serum, with normal horse serum, and with convalescent monkey serum were tested.

One net result is to show that, so far from possessing any protective or therapeutic power, Rosenow's antistreptococcic serum acts precisely as does normal horse serum. When injected intraspinally, it renders fatal an otherwise innocuous intravenous injection of poliomyelitic virus.

The results of these experiments throw the strongest doubt on the primary pathogenic rôle in poliomyelitis attributed by the school of Rosenow to the streptococci, and tend to support the contention of those who regard these organisms as secondary invaders.

¹Flexner and Amoss (*Jour. Exp. Med.*, 1917, XXV, p. 499).

THE PNEUMOCOCCI—A SUMMARY OF THE PRESENT SITUATION.

It is daily borne in on workers in diagnostic laboratories that no small amount of confusion exists in the minds of clinicians as to the exact status of the different pneumococci and as to the diagnostic and therapeutic applications of the discoveries concerning these organisms made during the last lustrum.

For this reason it has seemed worth while to collect, in the briefest form, the essential facts which should be known to every practitioner concerning the organisms causing lobar pneumonias.

It has been known, ever since the differentiation of pneumococci from morphologically similar organisms, and the establishment of their pathogenic rôle, that true pneumococci are invariably present in the respiratory passages of healthy persons. In the absence of any indicia permitting of a distinction being made between such saprophytic pneumococci and the pathogenic organisms found in the sputum and tissues of pneumonia patients, it was inevitable that some theory should be formulated postulating the shedding of the saprophytic character and the development of virulence owing to a lowered resistance on the part of the host.

However provisional such a hypothesis may have been considered by those who first formulated it, it is notorious that it soon became elevated almost to the rank of a dogma. Part of the confusion which has followed the battering of breaches in this etiologic theory is, therefore, natural and historic. We must, for this reason, first address ourselves to the clearing of our ideas concerning the relation between the saprophytic and purely pathogenic pneumococci. And here is the place to say that, so far as present knowledge goes, there are no purely and invariably saprophytic pneumococci, which fact accords with the old view. On the other hand, there are purely pathogenic pneumococci, for whose existence the former theory made no allowance.

The Gram-positive diplococci causing pneumonia and known as pneumococci can be divided, by their immunologic characteristics, into four main types. These are numbered from I to IV. Types I and II are invariably pathogenic; types III and IV are common saprophytes—sometimes pathogenic.

The statistics of the incidence of these different types in cases of pneumonia, when taken over large areas and from considerable numbers of cases and outbreaks, give approximately the following results: Type I is present in from 33 to 35 percent, type II in from 30 to 33 percent, type III in some 12 percent, while the remaining cases, about 24 percent, are due to type IV. When, however, particular epidemics are investigated, these averages do not hold, nor are they necessarily applicable in every locality.

The mortality of cases due to the various types is not parallel

with their morbidity, and, what is stranger, it is to the comparatively common saprophyte, type III, that the highest case mortality (45 to 50 percent) is attributed. Types I and II are about equally virulent and show a case mortality under 30 percent, while the comparatively benign type IV kills about 16 percent of the patients whom it attacks.

From the point of view of prognosis the importance of the differentiation of types is already clear, and it must be equally important from the epidemiologic standpoint, because of the possible occurrence of carriers for types I and II.

This differentiation has, however, a less obvious, but more important, interest—a therapeutic one. A serum, for which considerable curative power is claimed, has been prepared for one type and one type only, and that is type I.

This is not the place to discuss in detail the technic of this differentiation; it must suffice to give such an outline of the processes as will enable the practitioner to avail himself of the services of the expert technician in the most efficient manner.

For practical purposes it may be said that three methods are available, at the present time, for the differentiation of types.

The first of these depends on the agglutination, by specific antisera, of the organisms after passage through a mouse. Sputum is suspended in bouillon and incubated for two or three hours at 37° C. About half a cubic centimeter of this culture is injected into the peritoneal cavity of a white mouse. Ordinarily the animal dies in some six hours; if not, it is killed. The peritoneal cavity is washed out with isotonic saline, and it is on the resulting suspension of organisms that the agglutination tests are performed.

Agglutinative anti-sera have been prepared for types I, II, and III. Type IV is diagnosed by exclusion.

The second method employed is also an immunologic test, and it depends on the detection of a specific precipitin in the urine of the patient. It is applicable to the same types as the first method. Unfortunately only some 50 percent of cases due to these three types give the precipitin reaction. A negative result is therefore not significant, though a positive result is conclusive.

Type III is peculiar in the possession of a capsule, which can be recognized in specimens of blood or sputum treated with an appropriate capsule stain.

Up to the present time these are the only processes, clinically available, which have been elaborated. Avery, however, has discovered a cultural method of differentiation which is, unfortunately, too complicated for use in other than research institutions. Its chief virtue, at the present time, lies in the economy in white mice which it promises.

These little animals are extraordinarily scarce, and command

high, almost exorbitant, prices. To breed them and present them to the Red Cross or to the hospital laboratories of the country would be a very effective "bit."

Turning to the application of these discoveries in the field of therapeutics, I must emphasize, by repetition, that an effective, curative serum has so far been prepared only for cases due to type I, that is, for about one-third of all cases. In one series of cases, entirely unselected, except as regards microbic differentiation, the mortality was reduced by serum treatment to 7 percent from the usual 25 percent.

The most potent serum, hitherto prepared for type I, is of such a strength that 0.2 c.cm. will neutralize 0.1 c.cm. of a culture one-millionth of a cubic centimeter of which is the minimum lethal dose for a mouse.

In great contrast with this is the strongest serum against type II, which has only one-fiftieth of this protective power. The serum against type III has still less potency.

When one considers that the therapeutic dose of type I serum is 5 to 100 c.cm. every six hours until 300 to 500 c.cm. have been given, it is evident that the doses necessary in the cases of type II and type III would be impossibly colossal.

At this point I will leave my readers to draw their own conclusions as to the advisability of employing the "polyvalent" serums which are sometimes recommended for use in lobar pneumonia.

COLLECTIVE ABSTRACTS

THE DIAGNOSIS OF DISEASES OF THE CENTRAL NERVOUS SYSTEM BY MEANS OF THE CYSTOSCOPIC APPEARANCE OF THE BLADDER.

By JOHN R. CAULK, A.M., M.D., F.A.C.S., of the Editorial Staff.

The profession has recognized for many years that diseases of the central nervous system, particularly tabes, are associated with bladder disturbances in many instances, but has paid but very slight attention to involvement of this viscus. This has been noticeable, particularly in pronounced cases of tabes with bladder symptoms. There are innumerable cases of cerebrospinal disease which exhibit practically no general symptoms, but complain chiefly of the bladder. On this group of cases many unnecessary surgical operations have been done and various types of treatment instituted, usually with the idea of some other type of pathology. Recently, since we have been acquainted with the cystoscopic appearance of such bladders, very frequently a positive diagnosis of central nervous system disease can be made by the cystoscopic appearance of the bladder before any other symptoms show themselves. It is very encouraging to see the profession rapidly realizing the importance of cystoscopic investigation of the bladder in obscure urinary, sexual, and referred pain complaints. It is quite stimulating to see that within the last year quite a number of contributions have been made to the literature on this subject, all of them directing attention to the extreme importance of the recognition of the bladder picture in diseases of the central nervous system. Caulk and Greditzer found this bladder picture in a series of 117 cases. About 50 percent were confirmed by the neurologist as having neurological disease; the other 50 percent were not. Of the 50 percent of unconfirmed cases, about 7 percent were later confirmed, the diseases being cord tumors and paresis. Again, about 50 percent of the patients who had definite nervous system disease consulted the urological clinic first, as the bladder symptoms were most prominent, and in many cases the only ones, demonstrating the good fortune of having a definite cystoscopic picture by which such diseases may be diagnosed and serving to impress us with the importance of becoming acquainted with this picture. At the present time, with our knowledge of the bladder findings, we can hardly believe that it has been only a few years since some of the most prominent urologists were writing about prostatism without the prostate, atony of the bladder, retention of urine without demonstrable cause. Most of these cases were unrecognized central nervous system disease, and, now that we are capable of making a positive diagnosis in such instances, many complications following bladder operations may be avoided.

The typical so-called tabes bladder is found in numerous diseases of the central nervous system, such as tabes dorsalis, dementia paralytica, post-apoplectic conditions, tumors of the spinal cord, exophthalmic goiter, paralysis agitans, continuous retention catheter, lead poisoning, cerebrospinal syphilis, numerous psychoses, epilepsy, dementia precox, manic depressive insanity, and Smith in his recent article has noted the picture in syringomyelia, myelitis, multiple sclerosis, and neuritis.

A great many individuals suffering from sexual disturbances, referred pains, either in the perineum, groin, testicle, or back, which have been attributed to disturbance of the genital tract, prostate, urethra, and seminal vesicles, or to neurasthenia, and which have not responded to the routine treatment for such conditions, have been found to have central nervous system disease.

Since a great many central nervous system diseases present themselves during the age of prostatic obstruction, and produce symptoms which are practically identical to those due to prostatic obstruction, their recognition by the bladder findings is extremely important, as blind operative interference in such cases will in most instances lead the patient into serious consequences, and almost unquestionably be productive of post-operative incontinence. It has been quite definitely shown that post-operative incontinence following prostatectomy is usually due to the operation being done on a patient with central nervous system disease. There are cases, of course, in which prostatic obstruction and tabes are associated, and whether the patient should be operated on is difficult to decide. Young, in a report of median bar operation for prostatic bars or contracture of the prostatic orifice, has had several good results in removing bars in tabetics, and Judd and Braasch have recently reported the successful removal of prostatic obstruction associated with tabes in 9 cases. The decision as to whether to remove the prostate, under such circumstances depends on the comparative preponderance of symptoms resulting from mechanical obstruction or from urological changes. If the nervous system disease is slight, and prostatic obstruction seems pronounced and definite, then satisfactory results may be obtained. One has to be extremely careful, however, as often the prostatic bumper is the salvation to the weakened orifice of the tabetic. At any rate, surgeons must realize the association of these two diseases, and only after very careful study attempt the operation. This being the case, obscure post-operative incontinence attributed to prostatectomy will be thoroughly understood, and in most instances dodged.

DIAGNOSTIC FINDINGS.

A careful general neurological examination, coupled with a Wassermann and spinal fluid analysis, is always essential. The local findings are usually the following: the genitalia are frequently flabby; there is frequently suprapubic dullness from residual urine; rectal sphincter is usually relaxed, often extremely so; rectum dilated and flabby; urethral instrumentation is usually painless, as the urethra is insensitive. There is frequently spasm of the external sphincter, and on passing a catheter within the sphincter urine usually comes before the bladder is entered; there is generally residual urine, from 1 ounce to 1,000 c.c., and in the high residuals frequently a pronounced uremia, this uremia often being an important factor in the patient's constitutional symptoms; the cystoscope will usually note a marked relaxation of the internal orifice, internal sphincter being open, and allowing one to easily inspect the floor of the urethra, showing its folds, and usually thorough inspection of the verumontanum. Associated with this relaxation of the neck there are evidences of obstruction, as shown by trabeculation of the bladder. Koll was one of the first to call attention to the type of trabeculation in cerebrospinal disease. He believes that it was a more pointed, delicate trabeculation, and believed selected the lateral fornices of the bladder, and is usually finer, but in the experience of Caulk and Greditzer and others it frequently assumes various grades of trabeculation and often found generally distributed throughout the bladder; the trigone is generally elevated and fanned out, seldom thick and hypertrophic. With the association of the relaxed condition of the internal orifice without mechanical obstruction, and with the presence of

trabeculation, a diagnosis of central nervous system disease can usually be made. In the presence of prostatic lobes it is sometimes more difficult to make the diagnosis, but usually it is possible.

Cystograms frequently show a funneling at the neck of the bladder due to the presence of fluid in the deep urethra; often, however, in the most pronounced tabetics, there is a definite clean-cut line across the internal orifice due to the relaxation of the various bladder supports. The cystogram will show a marked toppling over of the bladder when the patient stands.

The treatment of the tabetic bladder has been deplorably neglected, yet most of the writers on this subject believe a great deal can be done by proper handling. In cases of residual urine it should be drawn at regular intervals in order to allow the bladder to contract, and spare it from over distension. Cystitis should be cared for by proper washing and urinary antiseptics. The bladder neck may be toned by instillations and by dilatations with the Kollman dilator and by means of endoscopic applications. Patients should be thoroughly trained to urinate at intervals, and to practice stopping and starting, thereby exercising the flabby musculature. With this line of therapy many tabetics may be made comfortable and able to empty their bladders completely, or nearly so. Those with uremia are the ones who particularly improve under drainage. It has been found that uremia is a very important factor in keeping these individuals so toxic.

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HUMBOLDT BUILDING.

ORIGINAL ARTICLES.

OBSERVATIONS ON THE MANAGEMENT OF PROSTATIC DISEASE BASED ON A SERIES OF FIFTY-THREE CASES AND PATHOLOGICAL FINDINGS.*

By ACHESON STEWART, M.D.

With a Note on the Pathology.

By V. L. ANDREWS, M.D.

Knowing that prostatic enlargement occurs in one-third of all men past the age of 50 years and that 10 percent of these cases require or should have surgical treatment, it is needless to state that the physician should be constantly on the alert to diagnosticate these cases in the early stages, and be thoroughly conversant with the proper methods of treating them.

Without surgical intervention the mortality will be 100 percent. With late surgical intervention the mortality will be appallingly high. With early and opportune intervention the mortality will be low. Having confirmed these statements by experience I would urge the physician to advise early interference and not wait until the necessarily fatal complications occur. Yet neither the patient nor the physician has been entirely at fault. The surgeon has been slow to properly develop his technic and skill in the treatment of this type of patient and consequently has had an almost prohibitive mortality. However, with increasing experience the surgeon is now able to offer a mortality of about 5 percent. In order to improve this rate the cases must be operated early, or prior to the onset of complications, and the surgeon must have had a large experience.

The removal of the prostate is not the most important step in the treatment of these cases. From my experience I would consider the following factors in their enumerated order as being the most important:

1. The exact determination of the patient's general condition.
2. The preoperative and postoperative treatment.
3. The type of anesthesia to employ.
4. The operative technic.

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Analysis of symptoms presented in this series of cases reveals the following:

1. Age. The oldest case was 84 years of age, the youngest case was 53 years, the average age was 65 years.

2. Difficult and frequent urination were present in 100 percent of cases. Difficulty or slowness in starting the stream is the earliest symptom and is often present for a year or more before the patient is aware of it, owing to its chronicity.

3. Chills were present in 14 percent of the cases. This is evidence of infection of the genito-urinary tract, especially a cystitis, or even a pyelo-nephritis.

4. Catheterization was necessary in 74 percent of cases and was largely responsible for the infections.

5. Urinary analysis showed infection in 98 percent and normal conditions in only 2 percent of cases. The infection varied from numerous pus cells to almost pure pus which was obtained at the end of urination or catheterization. It is not unusual to see a case in which there is constant residual pus in the bas fond or post-prostatic pouch. In fact, I have often been astonished to find an apparently clean bladder in this state, even after irrigation. The factors determining this are: The high position of the internal urinary meatus and consequent deep bas fond and the high specific gravity of the pus which seeks this position, its lowest level. The presence of residual pus will often explain the toxic and sometimes septic symptoms of these cases.

6. Residual urine was present in all cases. The largest amount was 44 ounces, the smallest amount was 2 ounces.

7. Bladder symptoms. (a) Acute cystitis in 48 percent of cases produced and aggravated by injudicious catheterization. (b) Normal bladder in only 2 percent. (c) Distention of bladder present in 84 percent. The degree of distention was variable. In some it was slight, in others it was decidedly above the umbilicus. The degree of chronic distention or residual urine is exceedingly important especially from the treatment standpoint, as we must bear in mind that the distention is not confined alone to the bladder, but it also involves much more vital structures—namely, the ureters and their pelves and kidneys. Owing to this condition the kidneys have been forced to gradually assume the ability to secrete urine against a high degree of back pressure, and will continue to do so as long as the secretory portion of the kidneys is equivalent to the physiological requirements. However, if this pressure is suddenly relieved by a cystotomy or even complete catheterization the kidneys may cease to act and the patient will die in 48 to 72 hours from uremia. It is in this particular condition that we have made the most radical changes in our two stage prostatectomy. This I will speak of later.

8. Position of the prostate. In 26 of the cases it projected toward the rectum and perineum. In 96 percent it projected into the bladder. In most of the cases the enlargement was intravesical, as this is the route of least resistance. The rectovesical fascia and triangular ligament obstruct its course toward the rectum and perineum. It is impossible to determine the degree of intravesical enlargement except by cystotomy or cystoscopic examination. I do not favor cystoscopic inspection of the bladder in the prostatic, as it is not always reliable on account of the blood present, and it is usually injurious and painful to the patient and may be followed by acute infection and chills. A small adenomatous intraurethral enlargement of the prostate will produce just as much obstruction as a marked intravesical projection of the middle or lateral lobes and may be overlooked by the cystoscope. It is usually not the degree of enlargement but more frequently the position that determines the obstruction.

9. Duration of symptoms. The longest was 25 years, the shortest 6 weeks, the average was a little over 5 years. It is difficult to determine the duration period, as the symptoms are often manifested so slowly that the patient is not aware of them. It is often only when the musculature of the bladder wall becomes decompensated and atrophied that active mischief is noticed. It is not unusual to find a patient with 20 to 40 ounces of residual urine and not aware of the fact. However, should infection occur, the previous chronic condition will immediately become acute and demand urgent relief.

10. Loss of nocturnal rest is present in all cases and is often an important prognostic factor, unless the patient obtains surgical relief. Frequency is sometimes greater at night than day. It is difficult to account for nocturnal frequency. It is probably due to static congestion of the prostatic plexus of veins, when the patient is warm in bed. These patients often refuse to drink water or any liquids in the evening so that urinary secretion will be at the lowest ebb. I think that is a mistake on the part of the patient, as the urine is then so concentrated that even the smallest amount in the bladder produces the desire to urinate and is injurious by interfering with elimination.

11. Type of prostate as determined by rectal palpation:

- (a) Soft and smooth in 66 percent of cases.
- (b) Hard and dense in 30 percent of cases.
- (c) Nodular in 4 percent of cases.
- (d) Hard and nodular in 18 percent of cases.

Rectal examination together with the clinical history will often denote the benignancy or malignancy of the prostate. A dense infiltrated posterior lobe with more or less fixation are indicative of malignancy. In cancer there is usually more pelvic and perineal

pain due to pressure and infiltration by the cancerous growth. The symptoms are of shorter duration, it is usually only a period of months, rather than years. Hematuria is not indicative of early malignancy and is only constant when the growth has involved the mucosa and the condition is then inoperable.

The methods of operating in the senile prostatic are now fairly well established. For several years I have been doing the two-stage method in the majority of cases. In this series only 12 percent were done in one stage, yet some men will still take the undue risk encountered in the one stage. Others will say if the patient is in good condition they do the operation in one sitting. How do they know the patient is in good condition? All the tests at our disposal often fall short of telling us the exact condition of the patient and they often leave us in the lurch. Not infrequently the subject that seems the best risk succumbs to shock. I must confess I cannot determine beforehand which is a satisfactory risk for the one stage. And yet sometimes where we have an apparently poor risk, the patient will make an uneventful recovery. The only safe rule is to consider them all bad risks and give them every advantage embodied in the two stage operation. I am convinced from my last thirty cases, which are not included in this paper, all were done by the two stage method, and of that number there was only one death, though many of them very poor risks.

Comparative statistics are rather misleading. The cases vary too much and some surgeons have the habit of selecting their cases. However, I am fully convinced that given a series of 100 cases done by the one stage and a similar series done by the two stage, there will be a very marked difference in favor of the latter. Yet some surgeons fail to give the patient this distinct mortality advantage. What are the arguments against the two stage operation? First and foremost, the longer time it takes for healing. This is not true in infected cases. How many cases in this series had pyuria? There were 98 percent and only 2 percent with normal urine. Yet suppose it does take a week or even two weeks longer, the time of these old men is not so valuable that we should endanger their lives. The first consideration is to save a life and get a good result. In our series the average time in the hospital was 33 days. The second supposed disadvantage is the longer stay in bed. I contend that to be erroneous. I get these patients, as a rule, out of bed between the first and second stage, put them in a wheel chair for part of the day and even permit and urge them to walk around. And after the second stage they are out of bed on the third or fourth day. The third disadvantage is giving these old men ether or chloroform twice. I see no excuse for using either of these two anesthetics. I have used nitrous oxide and oxygen now for two years and do not consider the anesthetic a factor as

there is absolutely no shock from this anesthetic, as the patient is never under its effects longer than fifteen minutes.

What part of the operation is the most serious? I always find more shock from the simple cystotomy than in the prostatectomy. Knowing that to be absolutely true you can readily see that a one stage operation is always attended with great risk. In other words, the one stage operation is done at a time when the patient's general condition is at the lowest ebb. No fixed time is even set for the second stage. It varies from four days upwards. We are careful to wait until the condition of the patient is good, and that is a very important point. In this series the longest interval was 28 days, the shortest 4 days, with an average of 9.6 days.

The technic of the first stage is very simple. The bladder is exposed, when distended, through a mid-line incision, sufficiently long, above the pubes. The bladder should be opened high. The peritoneum is striped off, giving a high exposure. By opening the bladder high there is less difficulty in healing, as the bladder is mobile at that point. Low down the bladder is more or less fixed to the pubic bone and there is a tendency in some cases to fistula. We are careful not to attach the bladder to the sheath of the rectus, but keep it back in its normal position beneath the recti. If the bladder is anchored subcutaneously there will be a tendency to fistula, as shown in our series in which 4 percent required excision of the fistula and pushing the bladder posterior to the muscles of the ventral wall. Since observing this change in technic we have not had one fistula. A large tube, 2 cm. in diameter, is inserted into the bladder (as shown in the chart). This acts as a reservoir from which the urine is drawn by syphonage. The recti muscles are drawn together at the upper angle by a chromic cat-gut stitch to prevent future hernia, which occurred in two of our cases. The wound is now loosely packed with iodoform gauze to stimulate granulation.

In cases where there has been a chronic over-distention of the bladder, the sudden removal of the urine by a cystotomy may terminate in a uremic death. In order to overcome this dangerous feature which I spoke of in the early part of my paper, we insert the tube and apply a purse string stitch around it to make it water tight, as is commonly done in cholecystostomy. A clamp is put on the tube and the urine is allowed to escape only at stated intervals, never allowing the bladder to be empty. By this method we can maintain the bladder pressure and gradually reduce its capacity so that renal secretion is not jeopardized. We usually take about three days; the nurse is instructed to open the clamp every six hours and allow only a gush to escape and then immediately to close the clamp. I believe that this has saved many lives in our work, as I have seen many cases of this type become uremic very quickly

after a simple cystotomy, when the bladder pressure has been suddenly relieved. The purse string and clamp method was used in 14 percent of this series. In addition to this precaution we also gradually catheterize these patients for 48 hours before operation, removing only a few ounces at a time and injecting into the bladder one ounce of 10 percent argyrol. It is this type of a patient we must hedge around with every additional precaution, because the prolonged over-distention has in every instance produced definite renal impairment.

The prostate is removed when the condition of the patient is satisfactory. The best method is the intra-urethral enucleation of Squier. The technic is simple and there is no difficulty in finding the dividing line between the enlarged prostatic portion and the rectovesical fascia or prostatic sheath. In our series enucleation was easy in 46 percent, fairly easy in 16 percent and difficult in 28 percent of the cases. By doing the two stage operation there is less danger of hemorrhage, as the periprostatic vessels are much less congested and the prostate is markedly reduced in size, as was found in 42 percent of our cases. However, we must not forget that hemorrhage is one of the serious and immediate dangers. The patient should never be taken from the operating room with active bleeding. Massage of the periprostatic tissues will often stop the bleeding, as this causes the vessels to contract and retract in the tissues. In case that is not effective I invariably pack with long narrow strips of iodoform gauze, which are removed on the second or third day. We had to pack 66 percent of cases.

The convalescence is usually smooth and the patient requires but careful nursing. It is not necessary to confine these patients to the hospital until the incision is completely closed. Eighty-six percent were voiding freely on discharge from the hospital. Epididymitis occurred in 12 percent of our cases. This is rather painful but not serious.

The pathological examination showed 18 per cent carcinoma and the balance 82 percent benign. This percentage of malignancy is somewhat above the average and in every instance it adds to the gravity of the operation. This type of prostate is exceedingly difficult to enucleate. If the malignancy be extensive the enucleation is impossible.

SUMMARY REPORT OF SERIES—MAY, 1915, TO MAY, 1916.

No. of cases.....	53
Average age	63 years
Youngest	53 years
Oldest (two cases—recovered).....	84 years
Benign	82 percent
Malignant (carcinoma).....	18 percent
Deaths	3
Mortality	5.6 percent

In a previous paper I reported 27 cases with no mortality, which, if added to the above series, reduces the mortality to 3.7 percent.

The Pathology of Prostatism.

Prostatism may arise from a variety of pathological conditions, the majority producing hypertrophy of the gland. Because of the position of the gland the greatest resistance to its enlargement is forward and the next downward (toward the rectum). Hence the growth usually takes an upward and backward course. As a direct result of enlargement there follow: (1) compression, flattening and elongation of the prostatic urethra, or lateral deviation of it, if one lobe greatly exceeds the other in size; (2) elevation of the vesical neck and outlet due to their intimate relation with the prostate, the base of the bladder being relatively unaffected; (3) in this manner a postprostatic pouch is formed which is lower than the vesical outlet.

Much has been written concerning this condition and many theories advanced to explain it, but so far none has received the sanction of the medical profession at large. Wilson and McGrath enumerate at least thirteen different theories in their recent article. These range from arteriosclerosis of the vessels of the gland to chronic infection, and from sexual senility to true tumor formation.

Virchow taught that the so-called hypertrophy should be divided into two classes, one belonging to the myomata and the other to the gland tumors. He believed the process to begin, as a rule, in the glandular portion with a gradual increase of the stroma.

Billroth wrote that, from his investigations, prostatic hypertrophy was not an adenoma formation but was a dilatation of the acini with perhaps some hyperplasia, and that nodular or diffuse myomata were common.

Cohnheim comes out definitely for the tumor theory as shown by the following: "The new growth which one commonly calls hypertrophy of the prostate is neither inflammatory tissue nor, notwithstanding its name, legitimate hypertrophy, but a true undoubted tumor formation."

Rindfleisch considered the hypertrophy as due to tumor formation and described two forms, a rarer fibrous accompanied by atrophy of the glands, and the more common a discrete nodular adenomatous.

Socin states that in his opinion the ordinary enlargement is neither of inflammatory origin nor a true hypertrophy, but a true tumor formation.

Birch-Hirschfield believed the enlargement of the prostate to be an expression of new growth and considered it to originate from the budding of the gland tubules.

Jores was probably the first to suggest that apparently hypertrophy of the so-called middle lobe took its origin from the sub-urethral accessory glands.

Ciechanowski wrote a voluminous article upholding the inflammatory theory of prostatic hypertrophy, particularly emphasizing the effects of gonorrhea. He considered that a long continued chronic inflammation was the basis for the changes which took place in the hypertrophied prostate. He admits that true adenomata and myomata may occur rarely, but have nothing in common with prostatic hypertrophy.

Lydston considered that prostatic hypertrophy began in the period of sexual activity and was the result of sexual excesses.

Albarran, with the majority of the French writers, holds that prostatic enlargement is due to true tumor formation, but opinions differ as to the source of the tumor, some holding that it springs from the periurethral accessory glands, others that it may come from any part of the prostate.

Rotschild is an advocate of the inflammatory theory, but believed the enlargement was due to dilatation of the acini. This is the result of obliteration of the excretory ducts. Bangs upholds this view also, but lays little stress on gonorrhea, emphasizing more particularly the effect of long continued congestion from long continued and often repeated sexual excitement.

From his investigation of the subject Wichmann considered that inflammation has little to do with the production of this condition.

Wallace, Tietze and Lendorf consider prostatic hypertrophy as adenoma formation, the latter believing that the tumors always come from the periurethral accessory glands.

In reviewing a series of 90 enlarged prostates, Thompson writes that he had never encountered an encapsulated adenoma or fibroadenoma and doubted if such existed. He considers that the enlargement is due to diffuse hyperplasia of both the gland structure and the musculo-fibrous tissue.

Not believing in the so-called middle lobe, Stocker holds that the enlargements which occur at the proximal urethral orifice are caused by either myomata or adenomata. The hypertrophy of the gland proper he believed is a true hypertrophy, which may be associated with encapsulated adenomata.

Adami and Nichols hold that the hypertrophy is the outcome of a long-continued chronic inflammation, more particularly involving the urethral portion of the gland.

Wilson and McGrath consider the process as a series of changes, briefly stated as follows: initial hyperplasia, blocking of ducts with concomitant filling of the acini and consequent muscular hypertrophy, atrophy and exfoliation of the epithelium, muscular overgrowth, connective tissue overgrowth.

Simmonds, writing in Aschoff's *Pathological Anatomy*, considers that the more recent thought concerning prostatic hypertrophy gives inflammation a subordinate place and true tumor formation the leading rôle.

Simpson in writing of a series of prostates obtained at autopsy says: "That prostatic enlargement may occur as the result of the dilation of the acini or from other of the causes assigned to it is not denied here, but that the seven enlarged prostates which occurred in my series were the result of true adenomata formation there can be no doubt, and I believe the majority of enlarged prostates are due to this cause." "In the first place it is against pathological principles to expect true hypertrophy at the time of life when enlargement of this gland occurs. Prostates that did not show adenomata showed atrophy at this age." Further, "a point of interest is that while castration causes hypoplasia of the prostate in the young and atrophy in the adult, it was not very successful as a therapeutic agent in the enlargement of this gland. The reason, I believe, is that we could not expect the procedure to have an effect on the new growth. This fact is well exemplified in the case reported by Moses, in which a so-called hypertrophy occurred several years after a double castration performed for another pathological condition."

Wade, in reporting 134 cases of chronic prostatic disease, "does not consider the changes found in the gland in cases of prostatic hypertrophy or," as he prefers to call it, "chronic lobular prostatitis, to be indicative of a truly neoplastic process."

Nemenoff brings forward an ingenious theory for hypertrophy of the prostate as a result of his experiments with the x-ray on the testicles of dogs. He states that, on the application of Roentgen rays to the dog's testicles, there is a destruction of the generative cells (the cells of external secretion) with a marked increase in the interstitial cells (the cells of internal secretion) and of the cells of the prostate.

The x-ray has no other effect on the testicle than to destroy the generative cells. Its nourishment is the same, consequently the interstitial cells are in a hypernourished condition and possibly are producing an increased amount of internal secretion. This again reacting on the prostate.

Of course, one cannot always apply directly to man the results of experiments on animals, but these striking phenomena inevitably suggest a connection with the hypertrophy of the prostate in the elderly. The prostatic enlargement occurs at that period of life when the generative function is on the decline, yet the interstitial cells probably retain their full functioning power or possibly there is a hypersecretion, and this may react on the cells of the prostate.

From the above survey of the literature it would appear that most

of the writers are in accord with the view that the condition is of neoplastic origin. With this view the writer is in full agreement.

In this series of 44 cases there were three outstanding varieties of disease leading to prostatism. (1) fibroadenomata of prostate subdivided into three divisions: (a) adenomata with little or no increase of stroma; (b) adenomata with a diffuse increase of fibrous and muscular elements; (c) adenomata with a diffuse increase of fibrous and muscular elements, and, in addition, from one to several small fibromyomatous nodules; (2) chronic interstitial prostatitis; (3) carcinoma of prostate.

The crux of the whole question of the enlarged prostate hinges on whether it is of true neoplastic origin or otherwise, for instance, inflammatory. Since we have never been able to formulate a hard and fast definition for a neoplasm, it is no wonder that we are in many instances unable to distinguish its boundaries, i. e., to state where chronic inflammation ceases and true tumor begins. There are, however, certain well-known landmarks that aid us in orientating ourselves. Briefly a neoplasm is a localized growth of tissue pursuing an independent existence from the parent tissue from which it springs.

In the enlargements of the prostate it is the glandular tissue that produces, in the great majority of cases, the hypertrophy of the gland. This is done by increase in size of the glands and in their number. In addition there are from one to several, or many, adenomatous nodules which exhibit all the characteristics of a true blastoma. There is marked increase of apparently new glands with a definite musculo-fibrous capsule. This is shown by its pushing the surrounding tissue ahead of it as it increases in size. The cells composing the new growth, as a rule, stain more deeply than the surrounding tissue. There is little or no interglandular stroma in the nodule. Generally there is a marked diffuse increase of the fibrous and muscular elements composing the organ. Many of the old glands may become cystic, but this has nothing to do with the neoplasm.

While I have classified this condition as a fibroadenoma of the prostate with three subdivisions, I believe they represent different stages of the same process. It may be that chronic inflammation, congestion or other irritation is the initial starting point, but by the time the patient comes for relief, and for a long time previous, true tumor formation has assumed the leading rôle.

Of the 44 cases, 36 or 81.72 percent come under this heading.

In the second division we have an entirely different process obtaining. Here the glandular structure is practically eliminated, being destroyed apparently by the encroachment of the fibro-muscular elements of which there is a marked diffuse hyperplasia. In this list there were two cases of this kind, or 4.54 percent. I believe

that this condition is the result of a chronic inflammation with destruction of parenchymatous tissue and replacement by musculo-fibrous elements. It is comparable, I think, to the same process in any of the other parenchymatous organs.

In the third group we have six carcinomas of the prostate, or 13.63 percent. Of these four are adenocarcinomas, one medullary and one an epithelioma (?) apparently from the prostatic urethra.

Undoubtedly an hypertrophied prostate provides a good field for the development of carcinoma and in looking over the literature one finds this condition credited with being the starting point of a large number of these tumors. In our cases the condition had progressed so far that the carcinoma had invaded practically the entire organ and it was very difficult to state whether a benign blastoma was the basis from which the carcinoma developed. I am inclined to think, however, that carcinoma of the prostate originates from an unenlarged gland much more frequently than is commonly believed.

Young reports 20 percent of his cases as carcinomatous. Wade reports approximately 10 percent. Young's percentage is high, undoubtedly due to the class of patients he draws.

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THE TREATMENT OF MORPHINISM BY THE REDUCTION PROCESS.

By C. B. PEARSON, M.D., Arlington, Md.

III. The Physiotherapy of Morphinism.

The title naturally suggests drugs, diet, rest, exercise, hydrotherapy, massage, and the general hygienic management of morphinism. I am not a physiological chemist, and can not say on my own personal authority that there is a condition of acidosis in morphinism. Dr. Jennings of Paris states that such is the fact. The increased appetite of most addicts for sweets would seem to point towards a condition of acidosis in these cases. Dr. Jennings advises the free use of bicarbonate of sodium. I have observed many cases treated with the bicarbonate and many treated without it. I have no hesitation in saying that there is less backache, leg-ache, less nervousness, and less insomnia, among the cases treated with the bicarbonate. I am also satisfied that the reduction can be carried on more rapidly without interfering with the patient's comfort, than is the case when the bicarbonate is not used.

Of course the reader is well aware that opium interferes with the function of all the excretory organs except the skin. And it may well be that the sodium bicarbonate in addition to being an antacid does good by stimulating the excretory organs. I find that constipation is the general rule even during the reduction of the drug. The bicarbonate does not completely overcome the constipation. However, it does lessen to a considerable extent the need for the administration of the harsher cathartics. This I think is a decided advantage.

Before going any further with this article I wish to emphasize the fact that I am writing about therapeutics as applied to the reduction method. I need hardly say that what might be good therapeutics in absolute or rapid withdrawal might be useless or much worse than useless in reduction. Very free catharsis is without doubt a good thing in absolute withdrawal of the drug. It is the reverse in reduction. It stirs up a call for larger doses of morphine. The ideal to strive for is one or two good movements per day. This result is very hard to secure by the use of the stronger cathartics alone. If the bowels are very much constipated it is advisable to fortify the action of the bi-carbonate by the addition of some other saline aperient, so that only small doses of the stronger cathartics need be given. Usually during the latter half of the reduction they can be dispensed with altogether.

Let us now study the action of the mydriatics in the reduction method. While in general practice I very rarely prescribed these drugs. So I can not say much about their general dosage. So far as the addict under reduction is concerned, the doses given in the books are many times too large. Dr. A. B. Palmer, now many years deceased, formerly dean of the medical department of the University of Michigan, frequently told his students, "In your zeal in combating disease never forget that you are also treating a live human being." There are three kinds of doses of the mydriatics. First, doses that will quiet the patient's nerves and promote sleep. Second, doses that will make the patient exceedingly uncomfortable, interfere with sleep, and interfere with the appetite. Third, doses that will put the patient under a complete narcosis.

The results of the administration of these drugs mentioned in the last two cases are entirely out of place in the reduction system of treatment. The purpose for which we use these drugs in reduction is in no sense as a substitute for opium. In small doses they check the profuse perspiration. They quiet the restlessness and promote sleep. The proper dosage is from gr. 1/1,200th to 1/600th, or in rare cases gr. 1/400th. There are not more than 5 percent of the cases that can take 1/400th of a grain 4 times per day without disagreeable dryness of the throat, disturbance of vision, burning of the skin, increased nervousness, and in many cases interference with sleep. However, when we do find a case that can bear these doses the drug works like a charm. The patient who can bear these larger doses of the mydriatic can be carried down the line more rapidly other things being equal than those patients who can not bear these doses without disturbance of vision, dryness of the throat, etc. When I say that larger doses than gr. 1/400th should not be given I have in mind the counteracting of uncomfortable symptoms produced by the withdrawal of the drug. When the patient is suffering from severe pain from other causes like neuralgia or other painful intercurrent disease, larger doses may be given. In such cases I combine the mydriatic with pilocarpine and eserine. An attempt to control pain with hyoscine or scopolamine alone would most likely result in having a delirious patient on your hands. In many cases the delirium would be so great as to call for constant watching.

The reader may ask what formula do you use.³ I prefer to give each drug separately. Enough pilocarpine to overcome the dryness of the throat. Both pilocarpine and eserine contract the pupil. Eserine is a powerful heart stimulant. It lessens reflex action. Hyoscine increases it. When the three drugs are properly combined there is no delirium. On the contrary, the patient drops into a peaceful sleep.

I have controlled such violent pain as the lightning pains of locomotor ataxia, with these three drugs. The reader may ask if this is so could not the discomfort of absolute withdrawal of the drug also be controlled by these drugs. Yes, most assuredly. Then why not at once withdraw the drug? Because such treatment is sometimes followed by fatal results. There are no fatalities with the reduction method. If there were not more than one death in a thousand cases, it would be an uncalled for death.

While there are no statistics, my observation tells me that the death rate is much higher than 1/10th percent. In about the same ratio this treatment is followed by permanent mental impairment. The percentage of relapses following it is much greater. The reader perhaps may say at this point that if the patient can be kept from getting morphine until he is well enough to be trusted, a cure can be secured. Granting that this is true, though I have my doubts about it (that is, about keeping a patient straight who is suffering) the advantages are all with reduction. The patient can not safely be kept under the influence of three such powerful drugs as hyoscine, eserine and pilocarpine for more than a limited time. There must be an awakening. From this time on until the patient is strong enough to be trusted, the suffering is many times greater than would be called for throughout the entire period of reduction.

If the patient is kept under observation as long as he should be the time devoted to the treatment is much longer than is called for in a skilfully applied reduction. If the patient is turned loose too soon and such is generally the case, he is almost certain to relapse if he can secure morphine. If he can not get the morphine he will get whiskey, even in a bone dry state. Whiskey under these circumstances is very toxic, very likely to cause profound mental depression. While in this state suicide is by no means uncommon. Even if the patient abstains from whiskey, the mental depression following absolute withdrawal is often so acute that suicide is frequent.

I have made these statements advisedly. There is coming a time when the entire medical profession will acknowledge the truth of them. I am positive about this because I know that as soon as the profession makes a serious study of morphinism the truth will be discovered.

To return to the use of hyoscine for pain I have found that gr. 1/200th is sufficient for an ordinary pain combined with the two drugs above mentioned. Three such doses an hour apart I have found sufficient for the most severe pain. Of the mydriatics I prefer hyoscine. It is not a whit more dangerous than atropine and has the advantage of greater hypnotic and analgesic properties. Improper dosage has given the drug a bad reputation.

Some credit eserine with being very useful in morphinism. As far as the reduction method is concerned I never use it except as above described. Pilocarpine I have found to be in these cases a valuable hypnotic. It is not so described in the books. A small dose just sufficient to produce a mild diaphoreses is sufficient. I have tried and discarded all the rest of the hypnotics.

I have found that during the reaction there is a call stirred up for increased doses of morphine. In the first part of the reduction, if the bowels are more than ordinarily constipated I have found the free use of strychnia to be useful to increase the peristalsis. If the small doses of the mydriatics is not sufficient to control the sweating some preparation of ergot may be used in addition to these drugs. Sulphate of spartein is a valuable remedy in certain cases. I have seen one or two cases where the chief discomfort caused by being a little short of morphine was through disturbance of the heart's action. In such cases spartein will do more good than an extra dose of morphine. Many patients suffer from cutis anserina and chilliness. In these conditions spartein is a valuable drug. Caffeine seems to have a favorable influence over the mental depression that we often get in these cases.

These are all the drugs that I have found useful or necessary in the treatment of these cases by the reduction method. The indications for their use should be carefully studied. No one of them should be used unless the indication is very plain and distinct. Routine prescribing should be avoided. In no case should shotgun therapeutics be used. The disagreeable after effects of all these drugs should be studied and avoided.

The morphine addict as the years go by often accumulates a number of other absurd habits and mannerisms. Among these habits may be mentioned peculiar habits of eating. So that in prescribing a diet for the addict correcting these faulty habits of eating is one of our first tasks.

A patient whom I treated for morphinism about 18 months ago, told me that his candy bill was larger than his grocery and provision bill and he said further that he ate all the candy. They eat it at all times of the day and night. Instead of eating three good meals a day, they nibble a little at odd times especially during the night when they should be asleep. Many of them have the habit of drinking strong coffee. And not infrequently get up in the middle of the night to prepare themselves some.

The breaking up of these faulty methods of eating is not so easy as it might seem to be. I try to persuade them that this is not the best way to nourish their bodies. I also let them understand that this sort of thing is one of the instances wherein their actions differ from those of normal people. And that if they are not careful they will call attention to their addiction.

There are exceptions to all rules. The whiskey and morphine addict is not so apt to have a craving for sweets. In morphinism the body is poorly nourished. There is not only faulty methods of eating, but also a lack of appetite for good, wholesome food. The cells of the body are starved as well as poisoned by the morphine and the retained toxins resulting from interference with excretion. This being the case there is a pronounced indication for a generous diet.

I give no tonics or proprietary so-called reconstitutives. Good, wholesome food is about the only reconstructive that is of any great value. As the dose of morphine becomes smaller the appetite improves. The appetite is, I think, also assisted by the persistent use of various salines. It is my opinion that the retained toxins as well as the morphine are responsible for the fickle appetite.

Occasionally I see a case where the appetite is good in spite of the morphinism. In nearly every instance my patients eat well after the first week or ten days. I encourage them to eat. Unfortunately in some cases the appetite is in excess of the digestive powers. When this is the case we have to guard against the patient's overeating. There is no need for any elaborate attention to so many calories of this and so many calories of that. The whole question of diet may be summed up like this. Correct their faulty habits of eating and feed them up. They need it.

Now we come to the matter of rest. This should be made to mean a complete mental and physical relaxation. Encourage the patient to leave his professional and business worries at home. These patients are inclined to fret and worry about this and that especially when they have no intoxicating doses of the drug under their skin. We can not get the best possible results unless we are able to stop the most of this worry. There are a multitude of ways of accomplishing this. The chief of these consists in diverting their thoughts to some more pleasant subject.

Of course we can not pay attention to every indication of grumpiness. It is necessary to keep close watch of them. And if one of them shows signs of being decidedly out of sorts, it is best to take steps to remedy the matter. Because the more cheerful you can keep a patient the more rapidly you can carry him down the line.

The sanitarium has decided advantages over the private home in this respect. As a general proposition the patient does better here when he or she comes alone. Some wives are a decided help in caring for their husbands. More often they are not. If the patient insists on the wife coming with him because of a lack of courage or for some other reason, I make no objection. But often I find that the wife demands more of my time to keep her from interfering with her husband's cure than the patient himself. The

improvement in a patient's appearance after the surplus morphine is removed is so pronounced that the wife can not understand why he can not run all over the city with her and take in all the sights. Especially as the man was working all the time at home when he had all the appearance of being far worse off. I can keep my patients comfortable on constantly decreasing doses. I can not do this and at the same time furnish enough stimulation to do a hard day's work sight-seeing every day or any day. On the other hand, if he is fretting about the house for the lack of something to do, I advise that he board a car and go to the matinée or to a picture show. At the same time I tell him that if he finds that watching the show is becoming fatiguing to leave at once and come back. I further tell them that when they go to a show to let that be the extent of their efforts and not attempt to do a lot of shopping at the same time.

Sometimes I have to lecture the wife very sharply to keep her from spoiling her husband's prospects of a cure. With many women it is, "I can't see why, and I do not understand, etc., etc." I tell them that it is not for them to know why. The reason why and wherefore is for me to understand and not for the patient or anyone else to burden themselves with. It is for the patient to follow my directions and for the wife not to hinder him in so doing. I have always managed by some way or other to keep the wife from hindering. Some wives are very quick to see what it is that I want their husbands to do, and are very tactful in getting their husbands to follow my directions. In this case instead of my worries being increased my work is made much lighter.

I would suggest to the reader that if he finds it advisable to send a patient to a sanitarium for morphinism, that he instruct the family to refrain from writing about anything that is going wrong at home. Many women are so conscientious that they think that they must tell not only the truth but every last bit of the truth. There are times when the telling of the truth is a great sin and the telling of a tactful lie a great virtue.

Sometimes I find it necessary to write the patient's home folks and tell them to be brave and bear their burdens alone and not trouble the patient with any of these things under any circumstances. At other times it is the patient that wants to be told of everything that is going on at home so that he will have an excuse to discontinue treatment. When a patient tells me that he has left instructions for his wife to wire him if such and such things happen, I know at once where the shoe pinches. The patient has not as much courage as he should have. In such a case I do not bother the home folks. I go after the patient. I tell him very kindly and gently but plainly that a man who is full of morphine is no good at home or anywhere else or at the best if he is still

of some use if he keeps on with morphine the day is coming when he will not be. And further if he cares for his family that the greatest kindness that he can do them is to rid himself of his addiction. Very likely he will say, "but you do not understand, doctor." I tell him that there are no buts to this proposition. Simmered down to the final analysis it is ruin or get cured. He knows this. This matter of final ruin is on his mind all the time. And that is why I can tell him these things thus plainly without making him angry. Getting the patients into a condition of complete relaxation of body and mind is a busy job. The more perfectly we accomplish it the easier it is to cure them.

Now we come to the matter of exercise. A moderate amount of exercise is by no means incompatible with relaxation of body and mind. There is one form of exercise that is very decidedly out of place. This is any form of exercise that calls for co-ordination of eye, hand, and brain. For some reason or other this sort of thing is very fatiguing. It is much easier for a patient to walk a mile than it is for him to write a letter. The patients soon learn this and write as few letters as possible. For this reason I prefer that the patient leave his automobile at home. While the driving of an auto does not call for as close attention as writing a letter it is wearing to the nerves and a hindrance to the patient's cure. Besides he is apt to get too far away and may suffer for his dose before he gets home. A trolley ride is better for the patient. A short trolley ride between doses is an excellent thing. This may be varied by a short walk between doses. Walking is an automatic process and can be managed better than anything else without bringing on fatigue.

Patients differ, some can get along more rapidly and comfortably by keeping absolutely quiet. Others do better by indulging in some sort of diversion. I try to select for each patient a line of conduct that will enable him to go down the line the most easily. In the latter part of the reduction entertainments of an emotional nature are best avoided. At this stage anything at all emotional excites the patient. An emotional picture show will cause a man to weep and at the same time swear at himself for doing so. Many of my patients have told me that they have become so wrought up over some sentimental play or scene that it took them four or five hours to recover from it. Something in the comedy line is decidedly better for the patient during the latter part of the treatment. At this time they laugh as easily as they weep and it is much better to laugh.

If the matter of exercise or exertion is important during the reduction it is much more important after the patient leaves us. For if he overdoes while with us we have the means at hand to afford relief from whatever uncomfortable symptoms that may

follow from over exertion. I have had physicians under my care who insisted upon at once returning to their practice who could not add up a long column of figures without becoming completely exhausted. This same patient might and probably would be able to walk two miles without fatigue.

Watch a patient just off the drug attempt to add a column of figures and first the face begins to flush and the perspiration starts out on the forehead and trickles down the face. After the patient has finished the problem, providing he is able to do so, he feels completely exhausted. There is a feeling of weakness about the back as if the spine would not hold the body up. There are, of course, exceptions to this. Some bodies seem to have the happy faculty of adjusting themselves to the withdrawal of the drug in advance of the reduction all the way through so completely that they seem to finish with about the normal amount of reserve nervous strength, and are able to perform difficult tasks with all the ease of the normal person. These cases are the exception.

The best course for the average patient to pursue during convalescence is to indulge moderately in some exercise that does not call for mental effort. And from time to time experiment carefully with some task that calls for co-ordination of eye, hand and brain until he finds at last that he can do these things without fatigue. It will then be soon enough to think of engaging in some serious occupation.

Hydrotherapy is not called for very much during the reduction of the drug. And then only when the patient becomes too tired after too much exercise. At such times a prolonged hot tub bath is very refreshing. The same is of course true during convalescence. Complicated hydrotherapy is fatiguing to the patient. A massage before retiring is sometimes an assistance to sleep. Out-door air and sunshine are, of course, beneficial in the hygienic management of morphinism. We cannot repeat too often that during the whole course of morphine addiction excretion is interfered with. Out-of-doors is better for this condition, than lounging about a stuffy, ill-ventilated room. Sleeping with the windows wide open will do much to do away with that bad taste in the mouth that so many addicts complain of.

Before bringing these three articles upon the treatment of morphinism to a close, I wish to call the reader's attention again to the matter of the patient's comfort. Comfort is the best possible indication that our efforts at removal of the drug is not putting too great a strain upon the vital powers of resistance. I have often heard the assertion that I always know that such and such a patient is not on the square because he is too comfortable. A remark of this sort indicates that the operator is ignorant of the technic of reduction. The comfort of the patient is secured by psychothera-

peutic efforts directed towards putting the patient into the correct mental attitude and to keeping him in this mental attitude, to the correct management of the reduction, and to the diligent application of the therapeutic measures mentioned in this article.

It is recognized principle of medicine that pain and discomfort are nature's signals that something is going wrong. This is just as true in the treatment of morphinism as it is in any other branch of medical effort. I need not tell the reader that it is better to secure this comfort by rational means than it is to secure it by *narcosis*. A patient study of the fundamental medical sciences and painstaking effort to learn and apply therapeutic details of technic have been the foundation of the success of all the noted specialists in medicine and surgery.

Empirical routines of treatment and vaunted formulae have never added much of value to medicine. My specialty especially is cumbered with these empirical methods and sure cure medication ideas. Eventually the profession will learn that hard work and close study are the only things that can really be relied upon in the treatment of morphinism. Why should it be otherwise? It is the rule that has been found to hold good in all other branches of medicine.

THE INFECTION OF WOUNDS.*

By FRANK WARNER, M.D., F.A.C.S., Columbus, Ohio.

The prevention of infection of wounds and the treatment of infected ones takes high rank as a surgical procedure. The possibility of wounds becoming infected is always a source of the keenest anxiety. When this complication occurs, in some wounds and in some situations, it calls for the very highest grade of skill to combat it; and, if this is not successful, either death or serious impairment of functional ability is the too frequent result.

To understand fully the influence of infection in retarding the healing of wounds, a comprehensive knowledge of their normal healing is necessary.

There are certain constant and essential elements necessary in the healing of wounds:

1. Fibroblasts.
2. Vascular endothelium.
3. Fibrin—a framework.

Other elements, as polynuclear cells, lymphocytes, endothelial cells, etc., are found in granulation tissue, and, while they subserve a purpose, yet they are not the essential elements constantly necessary to the healing of the wound.

One of the first things that takes place after an injury to tissue is the throwing out of fibrin, thus filling the space of the destroyed cells. The use of this fibrin is essential in the healing process in the following ways:

1. The fibrin in the wound acts primarily as a framework for the fibroblasts to develop the connective tissue.
2. It affords support to the vascular endothelial cells during the time of the reconstruction of new blood vessels.
3. The fibrin probably furnishes nutrition to the budding endothelial cells and the fibroblasts.

The fibrin acts only a temporary part in the regenerative process of wound healing and is soon replaced by connective tissue and blood vessels.

When infection takes place, lysis, or a solution of the fibrin, occurs. Infection kills many cells; upon the death of these cells, a liberation of proteolytic ferments occurs, which results not alone in the solution of the dead tissue, but of the fibrin also, upon which the fibroblasts and budding endothelial cells depend for a supporting framework for their growth, if not indeed for their nutrition.

*Read before the Association of Pennsylvania Railroad Surgeons, at Chicago, September 27, 1916; revised October, 1917.

Some of the proteolytic ferments may be derived from bacteria. Whether these ferments come from the cells which have been killed by the infection, or are a product of the bacteria themselves, the result is that the fibrin is now destroyed and washed out from the wound; so, when regeneration does occur, it must take place independently of this important aid of the supporting framework of fibrin, and of its probable ability to furnish nourishment to the newly developing tissue. Although, later, some of the defect may be filled in by connective tissue cells, regeneration is most marked on the part of the epithelium, hence the permanent defect, for the epithelium simply spreads over the raw surface as it finds it, even though much tissue has been destroyed.

This is the important part infection plays locally. Systemic infection depends upon the nature and virulence of the organism, the open wound affording an easy avenue of entrance.

Bone regeneration takes place much in the same way as the repair in other injured tissues, the osteoblast being simply a modified fibroblast. Much is still controversial as to the origin of these cells; but whether they come from the periosteum or from bone, or from both, the practical fact remains that the destroyed bone is repaired in much the same way as other tissues.

The same may be said of injured muscle; while destroyed muscle does not regenerate as such, still the gap is filled in first by fibrin, then fibroblasts from which to make the new connective tissue, and finally, vascular endothelium for the construction of the vessels. There is an attempt at re-formation of muscle cells at the edge of the wound, from the partially destroyed muscle cells, but main body of the gap is filled in by new connective tissue, which holds the strands of muscle together and enables the muscle to functionate properly.

The usual channel of systemic infection is through the lymphatics, but it may occur through the veins or arteries. Infection enters through these portals far more easily during the first few days after the occurrence of the wound, before they have had an opportunity to become sealed up by inflammatory reaction; after this, systemic infection less frequently occurs, though a local infection is quite apt to occur later.

Whether an infection of a wound occurs is largely influenced by:

1. *The Location of the Wound.*—Wounds about the head and face usually heal promptly, because these parts are so profusely supplied with blood vessels. The peritoneum has a wonderful ability to destroy infective material; bone, on the contrary, as well as joints, has little ability to overcome infective material when once implanted in a wound in these structures. When once established, infection is especially prone to spread in the palms of the hands and the soles of the feet; and this, too, with more disastrous local

results than in many other situations, owing to the infection spreading among the tendons and along them.

2. *Character of the Wound.*—Penetrating wounds are more inclined to suffer from infection than wounds of other types. The reason of this is obvious, because if infection is once started in the deeper structures, the opportunity for drainage or antiseptic treatment is, of course, limited.

Even if the wound is not a penetrating one, if the opportunity for drainage is poor, owing to the depth and character of the wound, infection is more inclined to spread.

3. *The Cause of the Wound.*—Those produced in unsanitary surroundings would be expected to be more inclined to infection than those produced under fairer conditions; but many surprises come up from time to time, as when a wound received under very unfavorable surroundings comes on without trouble, or one produced under conditions of seeming asepsis develops infection of the highest grade.

Of the pyogenic organisms, the staphylococcus is the usual germ of infection, the streptococcus less frequently. It is important to remember, at all times when treating wounds, that staphylococci everywhere inhabit the skin; and that it is an easy matter to push and roll these organisms into the wound unless great care is exercised to avoid it.

In the prevention of infection of a clean wound, one of the first things to remember is to disturb the wound and its surroundings as little as possible. Very commonly a clean wound becomes infected by changing the dressings too frequently: the wound during the process being subject to manipulations resulting in the introduction of organisms from the skin, or in some way by the instruments used, or by the dressings themselves, which last may have been aseptic at the commencement, but have become soiled during the time of making the dressings.

There are, primarily, two types of wounds that are to be dealt with:

1. *Wounds Made During an Operation.*—With the most profound care it is difficult to prevent infection during many operations, especially when considerable handling of the tissues is unavoidable. This very fact should admonish one to make as little manipulation of the tissues as possible; but, when this is necessary, one should constantly try to avoid the very things that are known to infect a wound. This necessity is multiplied when the operation is upon bone or in a joint, for both of these structures are easily infected and have little power of resistance.

It is difficult to understand, without reflection, why it is that one cannot introduce the gloved hand into a wound during an operation on bone or joint. Doubtlessly, the gloves are sterile at

the outstart of an operation, but it is not long before they have been brushed, repeatedly, against the edges of the wound where the skin harbors, at all times, staphylococci. The gloves are rendered in this way unsterile. Bone is frequently incapable of dealing with even this small amount of infection. So the necessity arises of never allowing the gloved hand, much less the naked hand, to enter a wound where an operation on bone is concerned. It requires no small amount of practice to use instruments, instead of the hand, in the bottom of a wound, but the results are so far superior in bone surgery as to demand the mastery of this technic. When it is mastered, one will see in every case the superiority of this method of procedure.

If one essays to do plating of fractures, every detail of superb technic must be followed during the operation. If it is not, failure will result. The failures in this operation have been many, but not all of these failures, by any means, have been the result of a poorly devised operation. More frequently it has been the fault of an inefficient technic.

It has been this, quite as much as anything else, that has brought such unfavorable criticism upon this operation. Even if it should be entirely supplanted by bone grafting, it has already served an excellent purpose in teaching surgeons the necessity of greater care in technic if they would avoid infection in bone surgery.

But not all cases are suitable for bone grafting; the bone may be shattered in a way that will not allow grafts to be used to advantage. But even if infection follows the use of the bone plate, union may still occur; but as the bone callus begins to form the plates may be removed if the infection is at all considerable. The very fact of removing them gives the much desired free drainage to the deeper infected areas. This should be followed up by the hypochlorite of sodium solution until the pus has well disappeared. At the same time a limb in which the fracture exists should be placed in a plaster case, with a generous window in which to allow the application of the antiseptic solution. The immobilization is essential not alone for the uniting of the fracture in a suitable alignment, but most infected wounds do best when placed at absolute rest.

The antiseptic solution may be applied constantly, intermittently at stated periods, or the wound be kept moist, applying the solution as required to accomplish this.

When a clean wound is once dressed, it should not be disturbed too quickly. If everything seems to be going right, the dressings should not be changed before the fifth or sixth day, when the superficial sutures can be removed, if indeed they have not already undergone absorption. The skin surfaces should be touched with iodine at this time to destroy any pyogenic organisms that may be

present and that would now have a better opportunity to grow and multiply in these stitch holes. Very great care should be taken at this dressing to avoid separating the edges of the wound, which are held together by a very frail tissue at this early stage of wound healing. Separated edges give new opportunity for the entrance of infection, in addition to consuming more time in the healing of the wound, and also giving a more unsightly scar in the end.

On the other hand, one may allow too great a time to elapse between dressings. When this is done there is great danger of the suture line becoming infected. The fact that pyogenic germs are harbored in the skin right up to this line, must not be lost sight of. After five or six days, at the most, the incision should be inspected. If it is deemed advisable to continue the presence of the sutures still longer, and they are seen not to be infected, the suture line should receive attention in the way of the use of some antiseptic, as tincture of iodine. Even before the expiration of this time, if the dressings have become soaked through with blood, immediate attention should be given them. Otherwise, with such a favorable soil for the development of germs, infection of the wound is pretty sure to occur. Or, if there is a slight rise in temperature, the wound should be immediately inspected. If there be evidence of an infected stitch, this should be removed and proper drainage established, otherwise the entire line of incision may become infected. The infected area should then be flushed with a mixture of peroxide of hydrogen and hypochlorite solution, and finally treated freely with iodine. If the dressings are watched closely, and the slight early infections treated, many wounds will heal by first intention that otherwise may become infected to an extent to delay healing and to leave an unsightly scar.

In suturing the skin surfaces together, one should use great care not to tie the sutures too tightly. This is a not uncommon fault; one that results in pressure necrosis. This necrosed area becomes an excellent medium for the development of staphylococci which are always found in the skin.

2. *Wounds the Result of Accident.*—The second type of wounds one has to deal with is those which are the result of accident.

All wounds received by accident should be treated as if infective material had been introduced into them, for this is usually the case. This, of course, needs to be done with greater thoroughness in some wounds and in some situations than others; but, in all, the wound should be freed of infection as thoroughly as the case warrants, or as it seems possible to do. In some situations, and in some wounds, this is possible only in part. It should be remembered that too much done to try to remove pyogenic organisms from a wound results in more harm than good. Lymphatics and capillaries may have been sealed over by coagulated material,

when by manipulating the surfaces the ends of these vessels are again opened; now germs get a new opportunity to enter. Most wounds are capable of disposing of a considerable amount of infective material; frequently they are not permitted to do so by reason of excessive manipulation of the tissues in an attempt to remove the infection that has entered the wound. In treating wounds that seem to have been infected, it is a good plan, when feasible, to flush the wound with hypochlorite of soda solution or tincture of iodine. Mopping out the infected area with a 5 percent solution of phenol or lysol is also desirable in some wounds. This has a two-fold effect: it takes out infective material and it destroys pyogenic bacteria present.

Equal parts of carbolic acid and camphor makes another valuable antiseptic agent with which to cleanse infected wounds.

When a septic condition of a wound is once present, it becomes necessary:

1. To immobilize the infected part.
2. To institute very thorough drainage by incisions sufficiently long and deep to accomplish the purpose sought.
3. To use the hypochlorite solution in suitable wounds and situations.

There is nothing to be gained, and much to be lost, by making an insufficient incision to secure a free evacuation of pus. A free incision relieves the pressure and consequent associated pain, and stops the likelihood of burrowing of pus. It may prove necessary, where the pus is buried deeply, to break through tissues and adhesions to reach it. Even after drainage is instituted, adhesions frequently form in a way so as to retain the pus in pockets. This often accounts for the rise in temperature which sometimes occurs when a wound which had been draining well has ceased to do so.

This is nowhere seen better than in a case of empyema. Unless the drainage is very carefully watched, it is not uncommon to see it cease entirely, and the temperature rise; if the adhesions pocketing in the pus are broken up, the signs of septic infection again subside, generally with rapidity.

In the palm of the hand, or in the region of other tendons, drainage tubes should not be used for an unnecessary length of time, because they increase the amount of connective tissue, which, in undergoing subsequent contraction, leads to a compromising of the function of the tendons.

After amputations, if infection manifest itself, it is important to remove a sufficient number of stitches to give free drainage of pus and serum. This stops the increased tension on the other sutures and limits the amount of infection as well as the burrowing of pus with its accompanying infection of surrounding tissues.

Then begin irrigations of the sodium hypochlorite, after the

Dakin-Carrel method, or of the hypertonic saline, the sodium chloride, with sodium citrate, following Wright's method, to secure an outward flow of the lymphatic fluid. The pus will usually subside by either of these treatments, in a short time. Here, too, as in the case of drainage about tendons, tubes should be used for as limited time as possible, as it is desirable to limit the amount of new connective tissue formation. The use of the hypochlorite solution, especially, limits the duration of suppuration and consequently the amount of connective tissue formation. Any large amount of newly formed connective tissue in amputation flaps usually leads to a painful stump. In addition to the hypochlorite treatment limiting this formation, by shortening the time of infection, it gives a reduced mortality after amputations.

In the use of the Dakin solution, one needs to be careful that it is reasonably free from alkaline reaction. This can be done by using phenolphthalein solution as an indicator. Carrel¹ insists upon this point as well as upon many other niceties of detail in the preparation of Dakin's solution.

Much has been said of late in reference to the employment of this solution. Many of its advocates are most enthusiastic with reference to its use. While some of the observers with opportunities to test the merits of the Dakin-Carrel method on a broad scale have ceased to use it, and now employ other methods to deal with infected wounds, yet none of them seem to offer any valid objection to its use. It is a harmless solution, without toxic properties, and in properly selected cases it seems to be a wonderfully efficient method of dealing with extensive wounds, either to prevent the appearance of infection or to combat it after it has once become manifest.

Sherman,² who has studied this method of treating infected wounds, speaks in glowing and enthusiastic terms of its beneficent influence: "The hypochlorites, no doubt, have a double action: direct bactericidal effect and the hyperisotonic effect, producing a flow of lymph from the surface of the wound and at the same time having intense antiseptic properties without damage to the tissues and entire absence of toxic absorption. Suppuration rapidly disappears; the discharge losing its fetor, takes on a serious character. The rapid disappearance of all pus, necrotic, dead, or decomposed material, within five to seven days, is the most remarkable effect produced."

In the employment of Carrel's technic, it is necessary to make a generous incision, so as to permit the easy introduction of the rubber tubes, which have been perforated first. Gauze is inserted between the tubes to prevent them bunching, and the hypochlorite is allowed to run in every two hours, or constantly by the drop method. Dressings are repeated daily, under strict antiseptic pre-

cautions, remembering that it is easy to reinfect a wound which has become sterile.

One cannot employ the Dakin-Carrel method without making free incisions for the deeper wounds, so that in addition to the antiseptic influence which the hypochlorite solution exerts, the additional advantage of ample drainage is secured.

The solution must be prepared with some care, otherwise irritative qualities are present, which make for failure in the treatment. There is no doubt that many solutions have been prepared which bore the name of Dakin, but which, in reality, had not been prepared by his formula. If one is going to test out the efficacy of the Dakin-Carrel method, it is only fair that the solution of hypochlorite of soda be carefully prepared according to the Dakin formula, and that the technic of Carrel be carefully followed.

Commercial products are now on the market which permit of producing an entirely satisfactory equivalent to Dakin's fluid by simple dilution.

Immense opportunities have come to those treating war wounds. Lessons learned there are of great advantage to apply to the treatment of wounds received in civil practice. Sencert³ had opportunity to operate on, or see operated on, 10,000 cases of war wounds. His conclusions in dealing with infected wounds are of interest and value. He makes the freest incisions so as to give perfect drainage and cuts away all lacerated and contused tissue so as to leave only healthy-looking tissue behind. Even in the fresh wounds, before infection has manifested itself, he cuts away freely lacerated tissue so as to leave behind no opportunity for a breeding place for germs in dead tissue. He has done away with antiseptics and irrigations and depends upon these dissections alone. With this method of treatment he has felt that the results have been superior to other treatment. He gives tables of his cures by this treatment which seems to bear out his assertions of its value.

Penhallow,⁴ in his recent work on Military Surgery, makes some valuable observations on the treatment of infected wounds. He lays great stress on adequate drainage as the most important thing in their treatment. He has used extensively the saline treatment advised by Wright and the hypochlorite solution of Dakin-Carrel. While placing about equal stress upon the value of hypochlorous acid and that of the saline solutions, on the whole he is slightly in favor of saline solutions.

The amount of literature produced on the infection of wounds and their treatment during the past year has been voluminous. In it all, the importance of free drainage has everywhere been proclaimed. In addition to whatever value the Dakin-Carrel treatment or the saline irrigations may possess in themselves, they both

require that ample opportunity for drainage first be established. The value of the ample drainage of infected wounds has been such that one of the observers, Sencert, already quoted in this paper, has abandoned all antiseptics, but he does cut away all lacerated tissue in the wound.

An infection may be, and usually is, of a local character at the outstart. If a high temperature and general reaction arise, it is nearly always due in the first instance to an absorption of the toxins, sapremia, rather than the toxins from germs which have entered the blood, septicemia. If at this very time free drainage be made and the hypochlorite solution used, the whole infective process will usually cease. If active steps are not taken, one may confidently expect germs of a pyogenic character to enter the blood and lymphatic stream, producing a true septicemia, and a continuation of the absorption of the toxins from the local source.

While drainage of the wound after invasion of the circulation by the germs and toxins does not give such brilliant results as draining when the toxins were locally produced in the wound by the germs there present, it is important to stop still further opportunity of entrance of germs into the circulation and the absorption of more toxins thrown off from the organisms in the infected wound.

In dressing an infected wound, it is well to remember that there may be an infected clot of blood in one of the neighboring veins, and that in dressing the wound care should be exercised not to exert pressure enough on it to dislodge the thrombus, which, in being carried to distant parts of the system, may produce pyemia.

Infected wounds, associated with compound fracture of the femur, often tax the ingenuity and resourcefulness of one to control it. There is a tendency for pus to travel along the various muscle planes, carrying infection with it. Free incisions should be made at the farthestmost places to which the pus has burrowed; different muscle planes may need to be opened up in different situations, and then drainage tubes inserted above, below, and especially behind, for the pus gravitates along these posterior muscle planes. After real, thoroughly complete drainage has been established, and not before, the hypochlorite of sodium solution by the Dakin-Carrel method should be used either by the continuous drop method or run in intermittently every two hours.

In this same type of wounds, the saline solution of Wright often gives a splendid response to its employment.

At the redressings of the infected wound, peroxide of hydrogen still holds its place as a useful agent in oxidizing dead tissue and in acting as a mild antiseptic agent in at least depriving germs of their nourishment. At the same time many germs are washed out with the destruction of the dead tissue by this solution, and a

cleansing action is produced by the disengagement of gas. Following the use of the peroxide solution, the wound should be flushed with tincture of iodine, of full strength if the wound be small, or diluted if large.

If the granulations have become sluggish, the instillation of balsam of Peru will often stimulate them to renewed activity.

Extensive wounds of the buttocks, as occasionally occur in civil practice, are difficult to keep free from infection. Unless the greatest care is used, the colon bacillus is apt to infect the wound. Also, the tetanus bacillus may infect these wounds more readily than in other situations. This is due to the fact, as shown by Pizzini, that five percent of human beings showed tetanus bacilli in the stools.

Davis⁵ has shown that these wounds in military practice take on readily gas bacillus infection. In the severe wounds of this region he makes a colostomy in order to avoid the likelihood of this type of infection arising. When once this type of infection has occurred, he does what is recommended in another part of this paper—an operation by making free lateral incisions so as to give good drainage. He also makes parallel incisions to the skin in the fatty tissue so as to admit air. As the gas bacillus is anaerobic, the admission of oxygen in the underlying tissues diminishes its growth.

In the plain infection of these wounds the Dakin-Carrel method of treatment will be found of service, and a dilute solution of quinine is efficiently destructive to the gas bacilli.

The open air treatment and especially the solar treatment of infected wounds has proven of distinct service. Many of these wounds which had become indolent and were showing foreign body reaction have shown quite prompt relief. The infection has subsided and the septic fever has disappeared. More especially has this proved true when the wound was given some additional treatment, as Wright's sodium chloride with sodium citrate solution used to irrigate the wound so as to produce an outward flow of the lymphatic fluid, thus washing out many of the pyogenic organisms and their toxins. If the infected wound is deep, the Carrel-Dakin treatment, by a continuous drop method, has proven wonderfully successful in many hands. Notably is this true with Eastman,⁶ who says that in treating wounds of an infected type, the agents which have proved of greatest value in the majority of cases are: "Solar therapy, open treatment without dressings, continuous irrigations with sodium hypochlorite solution."

Naturally, not all infected wounds are adapted to any given line of treatment, and the management must be varied to meet the different conditions, but in all one should try to ascertain that no foreign material remains behind in the wound and that it has ample drainage. Without sufficient drainage in an infected wound, it is a difficult task to sterilize it by any method that may be employed.

Everyone agrees on the importance of drainage in the presence of abdominal infection which has necessitated an operation. But this drainage is frequently inadequately provided for both in the size of the drains and their number. Even though infection has not appeared at the time of an operation, if the conditions are such as to indicate the probability of its arising, suitable drainage should be provided. For instance, following an operation for ruptured gall-bladder, the freest drainage should be provided, not alone at the seat of the gall-bladder, but a generous stab wound made in the left lower abdomen, and a large rubber tube surrounded by gauze inserted in both areas. Then if infection supervenes, depending upon the character of the bile, the drainage is satisfactorily cared for. A tube with a caliber of one-half to three-quarters of an inch in diameter is suitable for such a purpose. This type of drainage is imperative when the gall-bladder has ruptured through an infective process of the organ, and the gall is seen to have permeated the different parts of the peritoneal cavity. When ruptured by accident, the bile is more apt to be sterile, when the upper drain over the gall-bladder is sufficient.

Even in the face of serious abdominal infection, the drainage that is established is frequently insufficient, both as to size of the drains, their number and their distribution.

After operations for a perforated appendix, a large drain placed in an independent opening, below the main incision, is preferable, as it prevents the main incisional wound from becoming infected.

Wounds are occasionally encountered in railway surgery, and still more frequently in military surgery, in which infection with gas bacilli of one type or another occurs, associated with gangrene of the tissues. This is especially prone to occur when the wound is complicated by a fracture; it is more likely to occur if the wound and fracture are in the lower extremity, and still more apt to occur if these conditions are associated with injury to the larger blood vessels. One of my own cases forcibly illustrates this point. A man, 40 years of age, had received a wound in Scarpa's triangle, it being associated with a fracture of the femur and laceration of the saphenous vein. Forty-eight hours subsequently gas bacillus infection with gangrene supervened. After an immediate amputation at the hip joint, the patient made a prompt recovery.

The three types of organisms responsible for gas gangrene, according to Weinberg,⁷ are: *bacillus perfringens* (the bacillus of Welch), *vibrio septique*, and *bacillus edematiens*. In his cases these organisms were found either singly or in groups. He recommends wide incisions or amputation in the treatment of these cases.

Illustrating the infrequency of gas gangrene infection of wounds in civil practice as compared with that in military surgery, Ivens,⁸

in a study of 107 cases of gas gangrene, found that "shell wounds were six times as frequent in gas gangrene as in ordinary infected wounds." He also observes that "Sixty percent. of gas-infected cases had fractures, and 71 percent. of gas gangrene cases." Of 464 gas-infected wounds which he had observed, 25 had proved fatal from gas gangrene and four from tetanus. Forty-four cases in all proved fatal, as quoted by the International Abstract of Surgery, June, 1917, p. 617. Hypertonic salt solution, with 2.5 percent. carbolic acid, had proved beneficial in the earlier and milder cases, while free incisions or amputation in the more advanced cases was the treatment adopted.

The association of the cocci with the septic vibron or the bacillus *perfringens* (*bacillus aerogenes capsulatus*) portends a more fatal tendency than when the gas organisms alone are present, is the conclusion of Lardennois and Baumel⁹ in a study of 500 cases of gas gangrene. They found, too, that serious gas infections occurred in slight wounds without fractures as well as in severe wounds with fractures.

If it be true, as they observe, that saprophytic organisms living upon the individual or upon his clothing increase in virulence when once confined in the deeper structures of the wound, one should be admonished to try and remove or destroy these organisms early in the history of any wound, even though slight in character.

In the treatment of gangrene in a wound, these authors advise a free excision of skin, muscle and tissue surrounding the wound, even though it be small.

Penhallow, already quoted, advises, in wounds infected by *bacillus aerogenes capsulatus*, that the sloughs and the traumatized tissue be carefully dissected away and then that the wound be swabbed out with carbolic acid, followed by alcohol or iodine. He then uses a solution of hypochlorous acid or chlorinated soda. In the presence of cellulitis, he makes free incisions and puts in drainage tubes and gauze, so as to give the best drainage possible. Then he uses peroxide of hydrogen and irrigations of hypochlorous acid solution, employed in a more or less continuous stream. Later in the treatment he employs the saline solution.

It is important to note that it has been shown, both by laboratory and by clinical experience, that Dakin's fluid has a relatively feeble action against the gas gangrene bacillus. Solution of quinine hydrochloride, on the other hand, has on this organism a powerful specific action.

When treating a wound which has been inflicted in the presence of street dirt, associated with stable clearings, or in cars in which horses have been transported, one should bear in mind the possibility of infection by the tetanus bacillus and the advisability of administering antitetanic serum immediately.

The use of vaccines, either autogenous or polyvalent, has not seemed to me to be of much avail against the usual pyogenic organisms.

Ney,¹⁰ who studied septic wound treatment near the war zone in France, says that he always found wounds treated by Wright's 5 percent chloride of sodium solution with a small amount of citrate of soda to prevent coagulation, to be in better condition when they arrived at the base hospital than by any other method. He also speaks very highly of the Dakin-Carrel method of treatment.

Hingston¹¹ prefers the saline solution of Wright, which, with its hypertonic effect, brings serum from the body into the wound which has strong bactericidal effect, although he has used the hypochlorous acid treatment.

While both of these solutions are valuable in the treatment of infected wounds, as well as in those in which infection will likely follow, it seems to me that the saline may well be used in the milder grades of infection, but in the severer forms the hypochlorite treatment is more efficient. This, too, seems to be the observation of the largest number of surgeons who have had the best opportunities to make comparisons of the two treatments. But they all agree that efficient drainage stands ahead of any other one thing to be done in infected wounds.

When septic infection is once established, the keynote to its treatment is free incision and free drainage. Along with these, irrigations with the hypochlorite solution in some situations seems to be of great value. One should not be content with making an insufficient incision to reach the infected area in its length and its breadth, when it is possible to do otherwise. Nor should one delay in making these incisions, for there is the constant danger of the septic pus burrowing broadly and deeply; of large doses of toxins becoming absorbed into the system with their accompanying deleterious effect on the general constitution. Delay may mean even more: the germs themselves may be taken up by the lymphatics and thrown into the circulation, producing a true septicemia; or, a thrombus, becoming infected and thrown into the circulation, producing pyemia. If this septic infection is in bone, unless the pus is promptly evacuated and drainage established, death of the shaft of the bone may be looked for.

Wonderful advances are being made in the treatment of infected wounds received in the trenches; from these observations much can be learned how to handle those received in civil life, but one should keep constantly before the mind that efficient drainage is the most important thing to be established, and if this is really accomplished from the outset, fewer ill effects will follow.

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THE NEW PUBLIC HEALTH.

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Rarely has any sanitarian approached this subject without an apology for being ambitious. It is rather from the point of view of knowledge of how the teachings of this subject do not work out as well as why they do not work out, that one may well speak. Founded on the observations and experience of Chapin, the public health loomed large as a problem of the study of human beings rather than one of their surroundings. The keynote was well expressed as the solution of all problems of infection by field study. But little later Hill showed that there were six measures which composed the program. For the abolition of the infectious diseases, one measure only sufficed, "that the sociological supervision of all infectious persons when once found and supervised would stop infection in toto." Recently the new ideal of vital quality "greater human efficiency, a better quality of being," "dealing with diseases that are the small tax gradually increased over long years rather than the acute infectious diseases with their large mortalities and high degrees of preventability," represents Rankin's expression of the new public health. Periodic examination of adults, medical inspection of school children, oral hygiene, mental hygiene, education propaganda, regulation of working hours and dietetics are the lines of attack. At this time our national government is equipped with expert knowledge for the prevention of acute infections, teaching the public that any frequency of diseases in camps is a measure of such disease being brought in from without; conversely that when in the field those forces will be free from such diseases. Do not the statistics of causes of deaths in our troops abroad show that we have not yet reached bottom rock? That we have not and why we have not I believe may be shown from a very practical experience.

The first misstep was one hinted at but not sufficiently emphasized by both Chapin and Hill—namely, that the laboratory had been and would be unable to solve many problems, and that the epidemiologist working in the more difficult, less attractive field work, by statistical work would solve the problems. Hill emphasizes the problem as one where the vital statistician shall be the business head. At the present time those attempting to deal with the public health in terms of modern principles are using the entire structure of the old public health adding, and being guided by, the laboratory. Facts established by the laboratory elaborated by theories then

become established working bases for statistical work. With the absolute knowledge of how to control diseases so demonstrated, an absence of lowered death rates are charged up to some absence of publicity. The gradation to a public health as expressed by Rankin is then easy and certain. *Good business would demand that a study of why the old business failed should be made.*

What are the experiences of one who can qualify as an expert, going out into a community and studying by daily contact with every class of individuals making up that community, public health from the standpoint of all the old teachings combined with the knowledge of county, state and national as well as foreign advances. Starting with the communicable diseases, I selected diphtheria for such a study. Observations in terms of each reported case and its environs were made, as under the old terms, and whatever new that could be seen or found. Such, boiled down, gave the definite data which I have shown accounts for failure of control previously, as well as answering all the problems unsolved by the laboratory. Theory was untenable in the face of facts. Control was expressed in simplicity of operative procedures; shown exact by absence of return cases and infrequency of secondary cases; verified not only in reduction of reported cases but in deaths also, which is more essential. But control is not the final step. The latter is prevention. I have shown that even lacking sufficient assistance to carry out the principles of control, those measures applied when there are no reported cases can accomplish that end. There are two very essential points that have a bearing on the subject; the first is that diagnosis by physicians is no less accurate in communicable diseases than in general medicine as shown by Cabot. Indeed as shown by the statistics gained in the field partially corroborated by the laboratory, entirely so by neighborhood work, least so by an almost complete absence of postmortem, error in diagnosis may be in excess of fifty percent. Until doubtful cases can be confirmed by postmortem, control can yet be shown *if the sum of all communicable diseases is taken.* Such an interlocking showed me early in my experience that until all deaths from any one disease was indisputable, true statistics were not available from the reported incidence of cases and deaths. *Accurate vital statistics from the standpoint of morbidity and mortality are the province of the field worker.* The second point is that there is a total lack of appreciation of what constitutes a carrier. Fostered by the laboratory, carriers are healthy contacts of one previously or at the time ill of the disease. When freed from disease-bearing germs he is no longer a carrier. In that this is the basis of true prevention and in that it is today so construed in our army camps, I may well dwell at some length on this factor. Isolation for a period of time called the incubation period without development of disease, frees

individuals from isolation. Immunity from a previous attack of the disease frees the individual from any isolation. Examination of any large number of such immune individuals shows a certain number carrying unmistakable evidence of being active carriers of the disease when seen in connection with contact cases. Examination of those passed through a temporary isolation show at a later date that some are true carriers. You may wall off a population who are free from any evidence of disease yet having a certain content of immunes and infection will later appear. It is the constant oversight of those who have had the disease who, during any other illness make both new carriers and cases that is the basis of prevention of diphtheria. This is true in typhoid as well as in diphtheria, scarlet fever and measles without question, demonstrable in mumps, chicken pox and meningococcus meningitis. Its analogy worked out completely in the latter three as well as for pneumonia should be the immediate problem as to explaining the failure to control present day contact cases of these diseases. *Carriers in diphtheria, scarlet fever, and measles present a pathological picture to the eye. The laboratory and epidemiological history are both links for confirming the diagnosis.* It is now a demonstrable fact that a carrier in diphtheria may make other children in the family especially the younger ones even to the entire family, nasal carriers. During the first week or so, babies and younger children so afflicted have a slight temperature, and show milder signs of toxin absorption like anemia. None have ever developed faucial diphtheria. There is then a rational basis for the frequent immunity of several members of, or the entire family. I have evidence to show in a small number of cases that the same holds true for poliomyelitis. That a similar condition holds for other similar types of infection is a very practical problem.

As we watch the large population who call on a physician only when the expectancy of getting well is not fulfilled in the first few days of various illnesses, there is forced on the least observing that Rankin's vital quality may be a problem of infant and younger childhood infections. One is amazed that the span of life for the average individual lasts two decades when frequently during the year, not infrequently even monthly, that average young individual again has mild recurring inflammation of pharynx, ear, glands, larynx, appendix, "rheumatism," malaria, and "grippe." With insufficient time for subsidence of the mild inflammation and without treatment we find reason for "*school inspection for deformities, mental hygiene, dietetics and periodic examination of adults.*" The public education propaganda begun with public health nurses daily seeking the first member of the family to stir up a latent nasopharyngeal infection as frankly manifest as is measles, scarlet fever, typhoid or poliomyelitis, not infrequently simulating such

diseases, and when found preventing them from infecting others, can surely reap the harvest of true prevention. *Field work can demonstrate the small tax reaching over years of life begins with the babe in arms. We have waited too long if we begin with school age.*

There is another fact forced on the field worker. There is reason to pity the despairing frequently drunken father or mother when so found after the death of one or more children from communicable disease; even when month after month recurringly, each child in turn makes continued small drains on both parents for even short illnesses. Are there any statistics that those same parents also have a short bed illness not attended by a physician after the children have been ill? Nicotin, alcohol, and dietetics will need little attention when the vicious circle is broken by actual field work that can educate at the beginning, not after corrections are needed. There is today no class of the community, physicians included, who do not need education by practical experience with demonstration, that family and neighborhood illnesses not listed as "contagious diseases" are frequently due to the same infective organism and are preventable from the standpoint of secondary cases at least.

Much is being made today of public health education by pamphlets and lectures as well as by demonstrations by visiting nurses. The field worker after two or more years' experience among his populace asks himself the same question about two important subjects: tuberculosis and infant welfare. It is that whether the recurring infections do not arouse latent tuberculosis, whether an active form is not aggravated by such infections as to cause fatalities. Are not many of the problems of infant welfare, as relating to the infant as well as to the prenatal care of mothers, a measure of prevention of unstudied infections? May not a high frequency of streptococcal ovaries, uteri, and placentas be studied rather from the point of view of the mother, the child and the familial or neighborhood epidemics than being merely a gynecological problem? We do not know that stillbirths may be the sporadic manifestation of maternal renal infections of earlier life. Syphilis may be given its correct share only in comparison with all other infections when statistically studied in the field. One cannot go through an epidemic year of grippe without registering the need of field statistics as to the frequency and the later history of varying grades of infection of every known body organ including the brain. What is the frequency of epilepsy during and after such an epidemic; what was its relation to each case? More were seen during and following poliomyelitis than following any other communicable disease I have followed.

Are we not scratching the surface only in public health work when we are responsible for "fads and fancies" before we have

accomplished what the transition from the old to the new public health stands for?

That it is so may be proved very simply. Let every community of not exceeding 100,000 put into the field one who knows internal medicine including the so-called contagious diseases from as wide a personal experience as possible; he should know bacteriology as well; give him then the entry into all homes where any and all illnesses occur. After one or two years, depending on the breadth of his observations, give him a sufficiently large working field and office force and the community may obtain not only the results expected of the old public health, but will find the very proper perspective of every phase of public health work, including the financial end. The well rounded out general practitioner, with a very practical bedside experience and the proper perspective of all the links in the chain that go to make up not only the diagnosis but the treatment of the case, has an analogue in the one who should be responsible for the New Public Health.

The new public health is the sociological supervision of all infectious individuals at all times. Those individuals who have previously had infectious diseases represent the predominant problem.

THE TUBERCULOSIS OF INFANTS AND CHILDREN.

By MARY E. LAPHAM, M.D., Highlands, N. C.

If the vegetative nervous system and its ductless glands govern the development of the babe and child, then any interference with this proper government might result in an improper performance of functions which should be regarded as purely symptomatic of an underlying cause.

If tuberculous processes interfere with the proper functioning of the vegetative nervous system and its ductless glands, then any perversion of function might be regarded as possibly symptomatic of a tuberculous etiology, and the recognition of this association would constitute an integral part of the tuberculosis of infants and children.

One of the functions of the chromaffin portion of the vegetative nervous system is resistance to infections. It has been assumed by many authorities that the resistance to tubercle bacilli stimulates the chromaffin system to increased functional activity first resulting in the symptoms of hyperadrenalism, and that subsequently the exhaustion of this system causes the symptoms of hypoadrenalism to appear.

According to this theory we should expect to find during the first preliminary stages of hyperadrenalism, characteristic of resistance to a tuberculous infection, the symptoms of increased chromaffin activity. The blood pressure would be relatively high, also the percentage of hemoglobin; there would be a relatively high percentage of polylobular neutrophils and a low percentage of mononuclears; the skin would be dry and harsh and its pallor marked; the eyes somewhat protruding with dark rings beneath them; there would be a diminished production of hydrochloric acid, secretin, and pancreatic ferments; a low tolerance for atropine and adrenalin; an increase in basal metabolism apt to cause raised temperature, etc.

When exhaustion follows this period of preliminary overstimulation of the chromaffin system we should expect to find evidences of deficient chromaffin and relatively excessive autonomous activities. The blood pressure would be relatively low; the production of neutrophils would be lessened with loss of the polylobulars and increase of lower forms as Arneith has described in the shoving of the polylobulars to the left; an inability to assimilate iron as shown by chlorosis; a loss of calcium and phosphorus; loss of tonicity of the myocardium and vaso-motors; vaso-motor

instability as shown by flushings, sweatings, cyanotic stasis, erythemas, edemas, tuberculides, "scrofula," etc.; high tolerance of atropine and adrenalin with low tolerance of pilocarpine; in short, any or all of the general characteristics of an irritable autonomous system. A special feature of this irritability is seen in the clinical picture of hyperchlorhydria with its diarrheas and general abdominal distress so commonly occurring in infants and children. All the vagotonic manifestations, so often conspicuous in tuberculosis and constituting a large part of its clinical picture, find their explanation in this hypothesis. The exudative and spasmophilic diatheses; the gastrointestinal and pelvic abnormalities; the hematopoietic and circulatory failures, all are secondary, symptomatic expressions of a deranged vegetative nervous system and ductless glands whose functions have been interfered with by tubercle bacilli.

We can see the consequences of vagotonic irritability typically illustrated when enlarged bronchial glands press upon the branches of the autonomous nerves in the thorax. In erosion of the esophagus, pressure upon the branches of the recurrent laryngeal causes a tickling sensation in the larynx with hoarseness, pain, cough, and even laryngospasm; the terminal endings in the stomach respond by gastric irritability, an increased production of hydrochloric acid and the phenomena consequent upon this hyperacidity from distress and discomfort to the clinic picture typical of gastric ulcer or even tabetic crises. It has been repeatedly observed that insufficient chromaffin activity is highly characteristic of occult tuberculous processes and a predominance of autonomous equally so. Since both of these conditions are so often the consequences of unsuspected tuberculosis in infants and children it would seem highly probable that before we could comprehend at all adequately the intricacies of the diagnosis of tuberculosis during the stages preceding physical signs, that we must thoroughly understand all the functions of the vegetative nervous system and the ductless glands or else we shall not be able to recognize their perversions as symptomatic of tuberculous activities.

Failure to recognize the vagotonic vagaries underlying many of the functional diseases of infancy and childhood results in the treatment of these diseases as though they were primary instead of secondary and also results in failure to recognize the tuberculous nature of the underlying cause. To understand the constipation and diarrheas and gastrointestinal perversions of infancy and childhood, the excess or deficiency of hydrochloric acid, the spasmophilic closure of the pylorus, the insufficient stimulus to the production of secretin, the inability to digest starches and muscle fibers—in fact, all the consequences of hyper- and hypo-acidity with their consequent confusion of gastrointestinal functions, we must first

realize that the vegetative nervous system and the ductless glands govern these processes of digestion and control the courses of metabolism and that any interference with this control may possibly be due to tubercle bacilli even when there are no other suggestions of their activities.

A very sweeping assertion was once made by a competent tuberculosis specialist who said that tuberculosis is the disease of infancy and childhood pervading and permeating the world of children's diseases to an incredible extent. This extreme point of view has hitherto been regarded as symptomatic of the exaggerated value all specialists are apt to place upon their own specialty, but it is now becoming more and more possible to admit that a single cause when applied to the source of functional activities may extend throughout their perversions and thus be as far-reaching and as all-permeating as a fanciful imagination will permit. It begins to seem quite logically possible that the influence of tuberculous processes upon the vegetative nervous system may be so fundamental and so extensive and far-reaching in the perversions of functions that scarcely a functional or constitutional disease may not be conceivably associated with them. If this possibility becomes an accepted fact, then the recognition of occult tuberculous processes in infants and children will become overwhelmingly important and the pediatricist will realize that without this knowledge he can never adequately understand whether functional dyscrasias are primary or secondary. As tuberculosis specialists we often hear pediatricists say, "I know nothing of tuberculosis, I leave that to the specialists," and often there is a certain display of complacency as if this lack of effort to comprehend tuberculosis were creditable and indicative of their wisdom in restricting their experience to their own specialty. With increasing experience in the tuberculosis of infants and children we are more and more convinced that no one can adequately undertake the care of children until the ability to recognize the manifestations of occult tuberculosis is acquired. This does not mean merely the recognition of the features characterizing the accepted standards of diagnosis, for these standards are so gross and so easily recognized that they can hardly be avoided when they exist. The adequate recognition of harmful tuberculous processes before there are sufficient structural changes to be revealed by specific manifestations consists in a careful estimate of the vegetative nervous system and the ductless glands and in the exclusion of a tuberculous etiology in all cases of functional perversions.

We could quote case after case of careful dieting of children for temperature supposed to be due to intestinal intoxication when really symptomatic of the increased basal metabolism characteristic of hyperadrenalism. In one case we listened for weeks to the wailing cry of a girl of 13, "Mamma, I'm hungry," and witnessed the

distressed refusal of the faithful mother, afraid to feed her starving child for fear of raising or perpetuating the temperature. This child had for months been under the care of a most distinguished and competent physician who was thoroughly confident that his diagnosis was right, and that the condition was only to be remedied by most careful dieting. It took some time to persuade the mother that the child needed an abundance of food to overcome the tuberculous processes and that a little exercise was better than staying in bed.

The diagnosis of the tuberculosis of infants and children is far more complicated than the recognition of standards of diagnosis based upon the evidences of manifest cases. The significant points in the history of a case are not confined simply to exposure or heredity, but include the occurrence of associated or related diseases characteristic of the vegetative nervous system. As indicative of autonomous supremacy we recognize chorea, tetany, laryngismus stridulus, erythemas, edemas, eczemas, angio-neuroses, etc.; all these conditions are very frequently encountered in the histories of our tuberculous cases. An exceedingly common autonomous condition associated with tuberculosis is the "status lymphaticus" with or without thymic complications. This association of the "lymphatic temperament" with tuberculosis has long been admitted and has even been regarded as a predisposing cause. There is the well-known clinical aggregate of hypertrophied tonsils, adenoids, tonsillar ring, with pronounced mononucleosis and lack of neutrophils. This clinical picture may be the expression of perverted functions of the ductless glands, especially the thymus, influencing the vegetative nervous system by depressing the chromaffin production of neutrophils and exalting the autonomous production of lymphocytes, but whether the tuberculous condition associated with it is primary or secondary remains to be proven. In taking histories we must learn to appreciate the possibility that all perversions of functions and all insufficient functional activities may demand the exclusion of a tuberculous etiology far more than a history of exposure or heredity, whether it concerns the proper conversion of food into energy, the regulation of circulatory force, the production of blood cells, the regulation of temperature, the elimination or retention of solids or fluids, the assimilation of iron, calcium, phosphorus, and iodine, the storage of glycogen, in short, any derangement of vegetative functions. The relation of temperature to occult cases of tuberculosis is a puzzling one in children who are subject to rises of temperature far more varied in their nature than with adults. When there are no physical signs to confirm our diagnosis we are forced to depend upon symptoms indicative of changes in the vegetative nervous system. In the chromaffin pyrexias we find that the temperature is not as apt to be reduced by rest in bed and by

careful avoidance of gastrointestinal irritations as we expect it to be: on the contrary, a generous, free diet, with graduated exercise is more apt to be helpful. Autonomous temperatures seem to be associated with the increased dissemination of tuberculous toxins by the increased circulatory force when too much exercise is taken. This increased dissemination seems to cause anaphylactic reactions of an exudative nature in the respiratory tract, so that when too great a circulatory activity is induced by exercise we find that there is a tendency to coryzas, hay fever conditions, bronchitis, and even pneumonia. The circulatory insufficiency of vasomotor instability may possibly underlie many a case of asthmatic edemas of the lungs. The irritability of the autonomous system may even be increased by an insufficient quantity of fluids when the child does not drink enough. We have had cases of edematous asthmas with intense suffocation caused by lack of fluids which were associated with enlarged bronchial glands and peribronchial infiltration of the lungs as seen in x-ray plates, and we have found that these cases were markedly benefited by tuberculous vaccine treatments. When an infant or child coughs and we are unable to find any standard proofs of tuberculosis it may be well to remember that pressure upon the branches of the vagus by tuberculous thickenings or enlarged bronchial glands may not be associated with other physical changes sufficient to cause accepted physical signs and that negative findings can never exclude tuberculosis. How could pressure in the bifurcation space be revealed by physical signs? What relation have rales and dullness and roughened breath sounds to these conditions? All our accepted standards belong to secondary conditions far more than to the preliminary periods.

We place great value upon loss of weight, strength, appetite, and other constitutional conditions which are the direct consequences of changes in the vegetative nervous system and the ductless glands and so should be given even greater predominance than they now possess. Carefully considering the constitutional characteristics of the "pretuberculous" child we find that all these so-called preliminary manifestations are the actual expressions of actual changes in the forces governing the production of energy, the creation of appetite and weight, etc., and that they should indicate their true nature to us as well as their tuberculous etiology, for while the tuberculous changes may never lead to tuberculosis of the lung they may induce such changes in the metabolic processes sustaining life that the foundations of many of the chronic constitutional diseases of later life are laid. The recognition of this danger is almost as important as the recognition of tuberculosis, for it may well destroy the working capacity of adult life. The inability to create sufficient energy may possibly be due to flaws established in earliest life by the influence of tubercle bacilli upon the vegetative

nervous system and the ductless glands which control the production of force. It is quite possible that the cardio-vascular, arthritic, arteriosclerotic, diabetic, and other diatheses begin in this way because of imperfect metabolism or other flaws in the conversion of food and that the loss of health and working capacity due to these deviations from the normal in earliest life may rival in importance the devastations of tuberculosis proper.

We know that the proportion of tuberculous processes resulting in death is very small compared with the total mass of cases, but we have not realized that there is a world of inefficient forces due to tubercle bacilli which has never been explored or understood and which owes its existence to the flaws in the working forces of life established in infancy or childhood. In an exceedingly prominent Southern family, conspicuous for generations in the history of its state, the wife died of tuberculosis of the lungs at the age of forty, a few months after the birth of her sixth child. Her eldest son escaped, but his son died of tuberculoma of the brain. The eldest daughter escaped, but her daughter died of acute tuberculosis and her son is now ill with it. The next daughter is a sofa invalid with no strength, no energy, has to depend upon the services of a trained nurse for protection from stress so that she can enjoy the commonest sensations of comfort. The next two daughters are physically unfit for everything but minute analyses of their physical ill being. The youngest son escaped. Here is a family devastated by tuberculosis. Three out of six escaped, but two of these three saw the taint reappear in their offspring and three others are totally unfit for useful lives. Suppose this danger had been corrected when the mother was young, could any of this suffering have been saved? Does such a history suggest that an explanation of the tuberculous, the exudative, the spasmophilic, the arthritic, the diabetic, and other diatheses might be found in anomalies of the vegetative nervous system and the ductless glands and that these anomalies have a tendency towards transmission and towards developing under circumstances which would not affect a normal person? Would this explain many of the features of heredity and disposition or help us in understanding why tuberculous processes prove harmful in some cases and not in others? Has immunity anything to do with the vegetative nervous system and if this function should prove insufficient could we learn how to restore it?

The histories of insufficient production of energy are sufficiently common to make us wonder whether there may not be another world of harm wrought by tubercle bacilli besides the world of diseases of the various organs. Could it be that tuberculosis of the lungs is rivaled by loss of efficiency? That these functional consequences

are equally important with those caused by the direct presence of tubercle bacilli?

We know that the proportion of harmful tuberculous processes is very small compared with their total mass, but we have not yet appreciated how much of that mass remaining foreign to the disease called tuberculosis is nevertheless injured by these processes so that the loss of health, of vigor, and of working efficiency makes up a huge total. Is it not important that we should learn to recognize flaws in these working forces before the inability to create energy is permanently injured? Is it possible that some of these tuberculous consequences could be associated because of their effect upon metabolism with the development of chronic, constitutional dyscrasias developing in later life? Could functional derangements lay the foundations for the metabolic cardiovascular, arteriosclerotic, cardiorenal, and other future disorders? If so, then the detection of these functional derangements and their tuberculous etiology would not only aid our comprehension of tuberculosis as a whole, but also help us to understand and prevent the metabolic disorders of later life.

If the functions of the vegetative nervous system and the ductless glands include the conversion of food into energy the creation of blood cells, the elimination or retention of solids, the regulation of weight and temperature, the assimilation of iron, calcium, iodine, and phosphorus, the storage of glycogen, in short, all the bodily processes upon which the "higher life" is based, then any derangement of any of these functions might possibly be caused by tubercle bacilli and constitute the first indications of their harmful activities.

MANAGEMENT OF POLIOMYELITIS IN ACUTE STAGE.*

BY FRANK D. FRANCIS, M.D.,

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Prophylaxis becomes a very important feature because of the dire results following and our helplessness in the actual treatment of developed poliomyelitis. The case is handled like we do typhoid as to stools, screens, urine, bath-water, and flies; like malaria as to mosquitoes; like plague as to rats and mice; like smallpox as to isolation; like diphtheria and epidemic meningitis as to nose and throat care. These measures will probably seem ridiculous when the manner of attack is revealed. At present we have to take all known methods of prevention used in other diseases. Like other infections, probably the most danger is the actual source, which is some poliomyelitis case. We may think of flies, mosquitoes, infected water, milk, and food; we may surmise rats, fleas, birds, roaches, lice, and bugs, but they do not arouse the disease themselves—they themselves have been contaminated by some case previously. Probably many cases are scarcely ill with poliomyelitis, but they are sources of great danger and perhaps very innocently.

From the public health standpoint poliomyelitis brings up many questions with which we cannot go into detail and with which you are familiar, such as pure water, pure milk, and pure food. These involve a careful regulation of these supplies from their source to the consumer and the job is a big one. Food is subjected to such various contacts having many and varied sources. Unless absolutely sure of your supply, which seems almost impossible in a large city, the milk and water should be boiled, especially during the season of poliomyelitis, which is between May and November in this zone. Food inspection must be in the hands of local health bureaus and great watchfulness is necessary on their part. In this season I would give the child no raw foods, preferring cooked vegetables, fruits, and meats. Ice cream, ice cream cones, soda, common cups, handkerchiefs, candies, and the like, may be dangerous from more than one standpoint. The mouth and nose should be treated as sacred orifices. The general belief is that poliomyelitis enters by the nose or the mouth. To me the evidence points the mouth as the portal. The disposal of garbage and waste, dustless street cleansing, cleaning up of alleys, the movies, public conveyances, travel, gatherings of children, milk bottles, control of ver-

*Read before Jackson Park Branch of Chicago Medical Society, November, 1917.

min, burials, and visitations of sick are merely a few of the items that must be under the board of health control.

First, cases and all suspicious cases should be isolated as quickly as possible. Children's hospitals up to two years ago handled the cases in their general wards. Since then in this city hospitalization has been enforced and hospitals with facilities for poliomyelitis isolation are allowed to receive cases. Isolation¹ is continued for five weeks from the onset of the disease until some definite knowledge of the length of time a case is infective is revealed. No considerable argument can be brought against this interval. If it is not necessary, of course, it imposes needless expense, trouble and worry and probably causes some cases to be covered. In over five hundred discharges at the County Hospital we have never seen a return case, so the period at this time seems safe. In some states the period is two weeks and in others three. The virus has been shown in the bowel washings as late as five weeks. It is very likely the period of infectivity varies in the different cases.

As to enforced hospitalization, it has been a wise procedure. The average one of us cannot afford a rigid quarantine with trained attendants and physicians for a period of five weeks. Most of the cases come from families of moderate means and on leaving the hospital most of them say that they can't afford a specialist and must go to a dispensary for further treatment. In instances of those who can afford a private isolation hospital in their own homes hospitalization seems a hardship and with them there come a rub. Hospitalization removes the main source of danger and without doubt lessens opportunity to exposure of others. It separates child and parent, but this separation is much more appreciated by the parent than the child, as all of us who attend in children's wards know. It is really remarkable how little a child misses a parent after a few hours of isolation. Other arguments are dangers of cross-infection and also that poliomyelitis is so mildly infective that such a procedure is unnecessary. Hospitalization also deprives the general practitioner of some calls, probably, and, therefore, possibly some money. However, if hospitalization prevents in this city two children from having paralyzed arms or limbs, that fact would more than recompense our losses as practitioner, which loss has been necessarily small because there has not been reported over one case to each five or six doctors. Hospitalization affords a great opportunity to study poliomyelitis pathologically, clinically, and therapeutically, and with this apparently new and dreadful epidemic disease this study has been needed.

If kept at home the case should have rigid isolation. The room should be light, well ventilated and prepared as we do for scarlet fever or diphtheria. A trained attendant should be present and the members of the family excluded. One prevention in polio-

myelitis is worth about five hundred cures so-called. Contacts under sixteen years of age should be quarantined for two weeks and contacts handling food supplies should discontinue the occupation for two weeks.²

The carrier problem is a difficult one because at present it would be hard to prove one up. A possible carrier may instill five to ten drops of 10 percent argyrol in each nostril three or four times daily for three days. A child exposed might be treated likewise. The nasal mucous membranes produce protective substances and nasal washes may destroy them. Antiseptic nasal washes have failed in monkeys. If Dakin's is not irritant it may be used instead of the argyrol. I have seen no record of treating carriers by vaccines, or of preventing poliomyelitis by vaccines. I imagine a vaccine could be made from the coccus now known to be present in poliomyelitis cases. Trials of it would be worthy, especially as to prevention.

Flexner and Clark³ showed that hexamethylenamine inhibited poliomyelitis virus. In exposed children I would recommend a powder of hexamethylenamine, sodium salicylate, and boric acid. This powder dissolved in water is taken well by children. Dr. E. Ochsner⁴ has shown that boric acid may antagonize cocci. Sodium salicylate is well recognized as a urinary, biliary, and intestinal antiseptic. The urine should be watched carefully for irritation of the urinary tract and if present the hexamethylenamine may be stopped or lessened. In addition I would once administer calomel, followed by a saline and then if I wished to have a clean conscience I would give intravenously one of the serums now thought to possess immune bodies for the poliomyelitis virus. Such as human immune serum, the serum of Nuzum and the serum of Rosenow. Plain human serum, plain horse serum, and diphtheritic antitoxin may also have some virtue, but I would prefer one of first three. The giving of serum may seem rather farfetched because the chance of a contact contracting poliomyelitis is so small, probably less than one in one hundred chances. The results of a poliomyelitis are so pernicious and lasting that I believe every precaution should be taken to prevent it in a known contact, especially in a child under twelve years of age. Nuzum, Willys,⁵ and Rosenow⁶ report such favorable results from their serums in the preparalytic stage that I believe them worthy of a trial as to prevention. Rosenow⁷ claims a preventive in monkeys.

Every little disturbance happening in children in the season, such as coryza, sore throat, bowel disturbances, general aches and pains, headaches, etc., should receive careful examination and treatment and carried to their termination lest a focus for infection and intoxication remain. The nose, tonsils, and teeth should receive proper treatment and care. All bites, skin sores, and scratches

should receive antiseptic and healing treatment. Children need not visit sick friends and many well-known customs and manners of greeting and handling of children by friends and strangers may need changing.

This brings to the stage of invasion. As far as I know we have no specific, yet once the infection is started we cannot stop it, but its ravages may be lessened. We may use the results of past experience and treat symptoms as they arise. Good nursing and general care count for much. A large number recover with expectancy. Most deaths come with respiratory failure and a few from other types, especially upper neuron type. A few die from some complication during the course.

Past observers have noted many so-called abortive cases. Such, when treated by a serum, are very naturally included in the result of treatment column. The lack of numbers of observations and the absence of the knowledge of the percentage of abortive cases makes us withhold judgment. In the use of serums I may say that in addition to Nuzum serum I have used immune human serum, antidysenteric serum, diphtheritic antitoxin, and plain horse serum. I have seen good results with both antitoxin and antidysenteric serum, the latter in diarrheal cases especially. I may say that except perhaps in one instance I never saw a serum injure a case of poliomyelitis. In fact, they have seemed to do good and the foreign protein idea of treatment must be considered of some value. I am satisfied that non-specific serums and foreign proteins may aid in some cases. At present as these serums are not injurious I deem them worthy of a trial. They give us hope. Especially do I feel well towards serums that are supposed to be specific and my cases were given the Nuzum serum. This serum may cause a considerable reaction in a few cases, but a severe shock is rare. The serum was not administered to lethal cases, which usually means respiratory cases. I would give the serum intravenously or intramuscularly. I can see no more reason for treating poliomyelitis by intraspinal medication than pneumonia by intrapleural or peritonitis by intraperitoneal injections. The infection is not localized on coverings as meningitis, but is in the cord and the infection is diffusely scattered through the cerebrospinal system. Both Rosenow⁷ and Nuzum⁶ serums are obtained from horses immunized with the coccus obtained from poliomyelitis cases. Rosenow has shown that his serum neutralizes virus, prevents poliomyelitis in monkeys and is curative in them.

Rosenow⁷ withdraws slowly 5 to 30 c.c. of spinal fluid depending on age and pressure and if the fluid is positive the serum is given immediately, not intraspinal but intravenously. He activates his serum with guinea pig serum, but thinks the inactivated serum would work just as well. The serum is diluted equally with .85

percent salt solution and injected 2 c.c. per minute. The dose varies, babies receiving 3 to 7 c.c. Injection may be repeated in eight to twenty-four hours. His mortality in forty-four patients was 20 percent. With favorable cases his mortality was 8 percent. During the same epidemic of twenty-three untreated cases, nine died, a mortality of 35 percent. Of sixteen cases treated before paralysis, all recovered and fifteen of them with no paralysis. I would say that was a good result. He reports that headache, nervousness, restlessness, and tremor, disappear in a very short time. He can see that intraspinal injections might be of use, but does not give them because the results were good otherwise. Dr. Rosenow visited our wards recently and to me personally conveyed the idea that he considered the intravenous route the only one. Nuzum⁶ serum is given intraspinally and intravenously. A small child is given 5 to 10 c.c. intraspinally, very slowly, after withdrawal of a larger amount. At the same time 10 to 30 c.c. are given intravenously. In twelve to twenty-four hours injections are repeated, using temperature as a guide. Some cases were given 150 c.c. in 72 hours. Nuzum⁶ reports a mortality of 11.9 percent in 159 cases treated. In 100 unserumed cases at the same time gave a mortality of 38 percent. In 152 selected cases his mortality was 7.2 percent, while at the same period the city gave a mortality of 32 percent. The serum was used in ten nonparalytic cases and no paralysis developed in these cases.

To make a judgment from figures is difficult with reference to comparative treatments. Years, localities, and epidemics vary. In 1916 my mortality on all my cases which numbered over a hundred was around 9 percent. I could easily pick out a group of 50 or 75 with little or no mortality. At this time I used human immune serum, antidysenteric serum and antidiphtheric serum and in many cases expectancy, in fact most of them were treated expectantly. The very ill case we attempted a treatment. Out of seven of my cases treated by human immune serum the mortality was very high, four of them died, but they were very sick cases. In ten severe cases I used antidysenteric serum and three of them died. One of these cases had a complete paraplegia with respiratory paralysis and recovered. One ran a temperature to 106° F. with a pulse of 170 and frequent bloody stools and recovered. The others were milder cases with enterocolitis phenomena prominent. In the instance of the case with frequent bloody stools, high fever and rapid pulse, the antidysenteric serum acted like a specific on the constitutional symptoms. Previously we had tried diet, mild opiates, bismuth, and emetine with no results. My experience with antidysenteric serum in these cases with enterocolitic symptoms has been encouraging.

Just what is the cause of the enterocolitic phenomena in polio-

myelitis is obscure. Blood macroscopically occurs in five to six percent of the cases. This year I have had examined many stools and no special bacteria were noted. Personally I have tried agglutination tests on over one hundred cases of poliomyelitis in reference to the dysentery organism. These tests have shown to me in about 20 percent of the cases in the serum of poliomyelitis that there is some agglutinating power over the dysentery bacillus of Shiga. In 1916 the general mortality for the entire city was around 15 percent; in 1917 our mortality is much higher both in the hospital and in the city. This year a large majority of my cases received Nuzum serum. My mortality this year is nearly 27 percent in over one hundred cases. The difference in the mortality rôles of Dr. Nuzum's statistics arises from the fact that he selected cases for treatment and respiratory cases were not included. I may say with all honesty that the Nuzum serum has not lessened mortality as it has been used. It may have prevented more severe paralysis from developing, but it has not lowered my mortality rate as compared with another series in which no serum was used. As to preparalytic results, I am not in a position to judge because of the small number of preparalytic cases entering the hospital. The reports in the ten cases observed seem good. As to convalescence I can see very little difference between the serum and nonserum cases. The serum cases show no more complete recoveries than those with no serum.

Remember, we have vessels in the brain and cord that are congested. Hemorrhage and edema may occur. Around the blood vessels is forming a collar of small round cells—a perivascular infiltration which probably lessens the blood supply to the cells beyond. The ganglion cells are attacked and maybe dying. This is brought about by the poliomyelitis virus carried there by the blood or lymph or by continuity and the damage is being done by germs or toxins or both. Once this process has started in a delicate structure like the cord it seems almost beyond reason to expect much from a serum or a medicine. Something must be done before the process starts to revolutionize our treatment of poliomyelitis.

The case should be kept in bed and as quiet as possible. In addition to the serum I would drain the spinal fluid each twelve to twenty-four hours, depending on pressure, pulse and respiration and general condition of the patient. An open fontanel and bulging may guide you in the young children, as so many present this condition. Macewen's sign may also aid in the indication. I would eliminate through the bowels, kidneys, and skin. Fluids should be pushed and rectal enemas of salt solution or glucose are indicated if fluids are not taken well. Hot baths may keep the skin active and relieve cord congestion and fever. My idea here would be to eliminate toxin as freely as possible by any method possible.

Position might relieve congestion and edema of the cord and the prone position is indicated. Counter irritation and cupping may also be tried to relieve congestion. Pain and soreness is usually relieved by splinting or applications of heat in various ways. Painful parts may be wrapped in flannel. Frames keep away the bed clothes. If drugs are necessary for pain, codiene, aspirin, or the bromides, alone or combined, may be given. Various symptoms, such as sore throat, vomiting, pain, headache, tympany, convulsions, delirium, sore back, retention of urine, sweating, twitching and the like, are met symptomatically. In this stage quinine and ergot have also been recommended as well as numerous other remedies, but this brings us to the drugging line.

Arriving at paralysis it seems to me our line of action may change a little. We know now that our ganglion cells are failing, they are failing because of the presence of the germ or toxin of the poliomyelitis virus or because the blood supply is being cut off by perivascular infiltration, hemorrhage and edema. Can we treat or rouse up these waning cells? By giving an antiserum we may counteract the germ or toxin. By lumbar puncture we may relieve pressure and possibly allow more bodies from the blood to get into the spinal fluid. When we have a narrowing blood vessel by diluting the blood more blood flows through the vessel; that is, by lessening the viscosity of a fluid we can increase the rate of flow. Providing edema of the lungs is not imminent I would give an intravenous injection of normal salt solution and push fluids by the mouth. In a number of cases salt solution has seemed to me to be of benefit. Internally the citrates might be useful for the same reason of allowing blood and lymph to reach the cells. It has been recommended by Wright^s in these infections.

On the same line we give strychnine sulphate in large doses. It is a cord stimulant and poliomyelitis cases stand heavy doses well and I believe it of benefit. If adrenalin has any action, I believe it has, because more blood is allowed to get to damaged cells, either by local constriction or generally by increasing blood pressure, digitalis camphor, aromatic spirits of ammonia may have some use here if the heart is lagging. At this stage it appears we should use all means to get blood to the cells of the cord. To do this we can lessen pressure in the cord, we can increase blood pressure, we can lessen the viscosity of the blood and we may stimulate the nerve cells. Added to this, if the blood contains some antiserum it would seem all conditions are met.

The general care is important and difficult at this time. Nursing is no easy matter in the poliomyelitis case. Many wished to be turned every few minutes. Most of them are too young to control bowels and urine. Most of them have to be fed. Pulse temperature and respiration, especially, should be watched. They should have

a daily cleansing bath and cleaning up. The mouth must be kept clean. Some care is necessary to prevent sore buttocks and bed sores. Cleanliness and dryness is essential and pressure points should be relieved. Sponges of alcohol and talcum powder may relieve some. Flannel pajamas, or flannel gowns, or woolen stockings are necessary to keep them warm. The nursing of poliomyelitis is a very important part of the treatment.

Certain types of poliomyelitis vary somewhat as to management. In bulbar cases unable to swallow, the body fluids and nutrition must be maintained. Fluids may be given by gavage and rectally. Intravenous injections may be given here in some cases. Also in these bulbar cases the pulse may reveal evidence that the cardiac center is involved. Adrenalin, strychnine, and digalein may be given for the waning heart, but the treatment does not promise much. Often our case dies rather quickly.

The facial type in my experience is very hopeful if uncombined. In these we must give some attention to the mouth and the eye on the paralyzed side. Cleanliness of the mouth and argyrol or boric acid instillations to the eye answer well. These cases may need protection later on from dust.

Cases of the upper neuron type with stupor, coma, retracted head, spastic extremities, with or without convulsions, possibly with a high temperature, are hard to treat successfully. Drainage is done when the pressure is high. Bromides, chloral, and opiates may be necessary to control them along with hot baths or packs. Strychnine would seem contraindicated here. Nutrition must be maintained and all means possible should be used to eliminate toxins and help the body produce an immunity. Meningeal cases came under this group.

The neuritis cases frequently can not sleep on account of pain and require some anodyne hypnotic. Splinting is an aid to them. The ataxic cases seem favorable as far as life is concerned. We see quite a number of cases where the only visible difficulty is in walking. All muscles and reflexes are O. K., but the case staggers on walking.

The most important and distressing feature of poliomyelitis is the failure of the respiratory muscles. A great majority die from want of air; the brain and heart keep up their part, but the lungs fail. Elevation of the patient seems to help some, others breathe better lying flat. Lowering the head may aid some. We have about three varieties of respiratory paralysis and management depends upon the variety. When the diaphragm alone is working the patient breathes better lying flat. When the diaphragm is paralyzed and the accessory muscles alone are working, propping up of the patient is indicated. When the medullary cavity is involved it would seem that lowering of the head might avail something. Arti-

ficial respiration will keep some patients alive several days. The pulmotor has not earned a reputation in these cases. It does not seem to work so well in a conscious patient; oxygen inhalations may aid some. Medically, large doses of strychnine sulphate and salt solution intravenously or intramuscularly are indicated.

Bowel disturbances are another feature and from ten to fifteen percent of cases have diarrhea and five to six percent have macroscopic blood in the stools. These we try to control with diet. In several cases antidysentery serum worked very well.

Another distressing condition to treat is edema of the lungs. The bronchi, trachea, and throat fill with a fluid and often the patient is not strong enough to expectorate. In these cases turning the patient so that the fluid may run out is indicated. In some cases irrigation of throat with mild alkaline solution has relieved them considerably for the time. Atropine and cardiac stimulants are given. In these cases I wouldn't push salt solution. Bleeding may be of some benefit. Most of these cases succumb in spite of all treatment; however, I have seen quite a few recover. Oxygen inhalations are worthy of a trial in edema.

Bronchopneumonia or lobar pneumonia sometimes follow the respiratory paralysis and edema and must be treated as these diseases. In retention of urine hot applications or injections of pituitrin may be tried. I believe it is advisable to postpone catheterization as long as possible. In our wards in true poliomyelitis the catheter is used very little. In this entire season I know of but one case requiring catheter and that is a doubtful case. Tetany has been a distressing condition to treat in several of my cases. Hot baths, calcium administration, and attention to the digestive trace have aided some.

After the tenderness and pain of the paralyzed parts are gone, baths and light massage are proper with passive movements. We have had no experience with electricity and from reports see little encouragement for its use in the acute stage. Potassium iodide has been used some in the latter part of the acute stage. Some wish the paralyzed muscle to be put absolutely at rest. Especially a one-muscle paralysis. I notice orthopedicians have a tendency to apply a cast putting that muscle at rest.

My opinion is very much against such casts for rest; I do not favor them, unless there is a tendency to deformity or persistent tenderness and pain. From observations on cases not put into casts they improve, as far as the acute cases go, just as well and more often better than the one in the cast. With the cast the limb encased swells a little and from applications of casts in injured arms we know how often the muscles become weaker and smaller and it takes time to overcome the result of the cast application. A cast has a depressing action in a child. Also a cast, in preventing one deformity

may cause another because these children exert every muscle and means possible to overcome the inconvenience of the cast. A cast, also, is less cleanly and pressure sores may develop unless watched carefully.

What we must do, however, is to prevent deformity from coming. The orthopedician can do much for a limb if there is no deformity. If it is present he has to correct it. The time for that is not to allow it to occur. With the least tendency to toe drop or knee flexion or what not a cast or splint should be applied to correct it. All casts or splints in this acute stage should be easily removed so that the part can be bathed and rubbed and moved a little. Our case has now reached the convalescent stage and passes down through the ages in the hands of the orthopedician whose field we dare not tread upon.

As to the future, the greatest hopes lie in something to prevent poliomyelitis, like vaccination or something to counteract it before paralysis results. Paralysis frequently develops so rapidly that I believe the greatest hope lies in something to make us immune to poliomyelitis.

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TEN YEARS OF SERUM TREATMENT FOR HYPERTHYROIDISM.

By S. P. BEEBE, Ph.D., M.D.

A little more than ten years have passed since the first patients were treated with a serum prepared by inoculating an animal, rabbit, or sheep, with proteins from the human thyroid gland. During this period several thousand human patients have received injections of this serum, and treated patients have been observed for a sufficient period of time to draw fairly definite conclusions as to the value of the treatment and its place in therapeutics.

The serum treatment has been the subject of active criticism from several writers during this period, which criticism has been voiced almost exclusively by men who have had little experience with it and based for the most part upon theoretical grounds. The final test of all therapeutic measures is their efficacy in the treatment of disease and a method which fails by this test will shortly be discarded regardless of the seemingly sound theory of its foundation. It is equally true that a method which succeeds by this test is a permanent addition to therapeutic practice. It is the purpose of the writer in this paper to review the results obtained by the use of serum in the treatment of hyperthyroidism and to answer the criticisms that have been made regarding it.

The method of preparing the serum and the reasoning which prompted its development have been published in detail in so many places that only a brief review of these matters will be presented. The recent observations and experimental evidence regarding the origin of the symptom complex which we recognize as hyperthyroidism, Graves' disease, exophthalmic goitre, have confirmed the premises at the basis of the serum treatment. During the active stage of hyperthyroidism the thyroid gland secretes an over abundance of an active substance, presumably of protein character, which in its turn stimulates the heightened metabolism, increased heart rate, loss of weight, tremor, sweating, etc., which are characteristic of the disease. The causes which excite this over activity are not fully understood, but there can no longer be much doubt that the excessive activity of the gland is in part due to the nerve stimulation it receives. Actual analyses show a discharge of iodine from the gland during nerve stimulation and Cannon's experiments of nerve grafting have left little room for controversy on this point. There is a strong probability that the active substance leaving the gland under this stimulus is an iodized protein. Kendall's experi-

ments, although exceedingly interesting, do not controvert this belief. His highly active iodine compound is produced only by a drastic cleavage. The thyroid effect obtained by the administration of human thyroid extract to a sensitive subject in every way duplicates the symptoms of the disease complex.

A fundamental premise at the basis of the serum treatment is the assumption that as a consequence of nerve stimulation, or chemical control, the thyroid gland during periods of over activity passes into the circulation an excessive amount of a physiologically active protein. This assumption has such an abundant amount of support from the experimental and clinical evidence that it is not deemed necessary to restate the evidence upon which it is based.

The second premise is the assumption that an antiserum can be developed against this protein by inoculating it into an alien species of animal. For practical purposes the animal selected has been either a rabbit or sheep. There can be no doubt that antibodies are developed in an alien species by this process. It is indeed a fundamental proposition in immunity that the parenteral introduction of a protein into an alien species will stimulate blood and tissue changes which are recognized by various tests such as the precipitin, agglutination, complement fixation, Abderhalden cleavage test, and these tests are constantly used to demonstrate the presence of what are called antibodies. Protein from the thyroid stimulates the production of such antibodies quite as effectively as other forms of protein. In many previous papers the writer has stated the methods followed in demonstrating the presence of antibodies in the serum of animals so injected. The point toward which the criticisms in regard to this method of treatment have been directed is not, however, toward this conclusion, but it has been maintained by the writer that such a serum properly prepared develops antibodies especially active toward the thyroid antigen. This idea of specificity is the bone of contention, the real point at issue in the whole question from a theoretical standpoint.

The serum treatment for hyperthyroidism had its origin in a series of experiments made by the writer to determine whether a serum could be prepared that would show *in vivo* a destructive or toxic action toward a selected organ. Proteins were prepared from the kidneys and livers of dogs, and these were then inoculated into rabbits. The tissues were washed as free of blood as possible, and the proteins prepared by precipitating the saline extract with acetic acid. In the original paper such proteins were called nucleoproteins, but protein nomenclature was not quite as exact twelve years ago as at present. The term nucleoprotein is not an exact chemical term and it would undoubtedly have been preferable to have called these proteins by a less confusing name. The writer followed the lead of Halliburton, the English physiologist, in using the term

nucleoprotein as applied to proteins so prepared. Serum prepared in rabbits as described as inoculated into healthy dogs both subcutaneously and intravenously, and it was found that the animals could in many instances be killed by such serum and the organs showed destructive lesions in the selected organ. The kidney antiserum showed its action particularly in the kidney, and the liver antiserum was particularly active against the liver. The question of specific cytotoxic serum was much more actively discussed at that time than at present and since the experiments reported were the first in which isolated purified proteins rather than organ hash were used as antigens for this purpose they attracted some attention. Pearce and Jackson very shortly attempted to repeat the work and while they admitted some evidence of kidney irritation concluded that an antiserum so prepared had no specific action on the organ furnishing the protein antigen. Indeed, their work was accepted as a successful refutation of the claims made by the writer. They did not, however, follow the technic of the writer. In fact, they modified their technic without any adequate reason, and yet maintained that they could not duplicate the writer's results. The modification consisted in boiling the organ hash in an alkaline solution before precipitating with acetic acid. Proteins are readily denaturalized by boiling temperatures particularly in either an acid or an alkaline medium, and there is no justification in considering their results with denaturalized antigen as having any force in controverting the results obtained by the writer.

It is contrary to human experience to expect a boiled egg to hatch.

The proteins prepared by the writer were prepared with the greatest attention to detail, and at no time was there a longer period than twenty-four hours between the receipt of the fresh organ from the dog, and the injection of the antigen prepared from it into the rabbit. In this way the minimum of hydrolysis was obtained, and the proteins were not injured by strong salt solutions nor by acids, alkalies or preservatives nor denaturalized by boiling. The writer has never been able to obtain satisfactory antiserum with the boiled proteins of Pearce and Jackson.

The question of organ specificity has been the subject of much debate and has been attacked by a variety of methods. The conclusions are not in harmony, but the sharp specificity shown by many experiments cannot be controverted by the demonstration that such serum has likewise some general antibody that may be demonstrated by such an exceedingly sensitive reaction as the complement fixation reaction.

While the writer has shown by various methods a markedly specific action between organ protein antigen and antibody by experiments *in vitro*, the most conclusive results from the therapeutic standpoint have been *in vivo*.

Two years ago the specificity of organ serum was demonstrated in the writer's laboratory by a new method. Two rabbits were immunized; one with protein from dog's thyroid, the second with protein from dog's kidney. The tests were made by incubating frozen sections of fresh organs in various dilutions of the antiserum for varying lengths of time and then washing briefly in salt solution, mounting and staining on a microscopic slide. Salt solution and normal serum were used as controls. The results showed that the thyroid sections were rapidly attacked, and digested in the antithyroid serum to such a degree that scarcely any cell structure could be found after exposure for one-half an hour in dilutions up to 1-150, while in normal or antikidney serum in concentrations as high as 1-5, or 1-10, practically no change could be found in two hours. In fact, the normal or antikidney serum preserved the thyroid tissues better than salt solution. In the same way the antikidney serum acted upon the section of kidney tissue which was in turn not acted upon by the antithyroid serum. The action demonstrated by this method is not different in its basis from that described so fully by Abderhalden. It was, in fact, devised to simplify the Abderhalden method. The sharp specificity shown in the action of the antiserum on its appropriate tissue antigen is a further confirmation of results obtained by other methods. The conflicting conclusions that are found in the literature regarding the possibility of producing specific organ cytotoxins are in part due to the wide variations in experimental methods and it is quite possible that certain methods are so sensitive that they serve to detect in vitro the presence of antibodies present in such small concentration that in vivo they would have no significance. The thyroid gland produces in considerable quantities a protein that has no precise duplicate elsewhere in the body. That its injection into an alien animal will stimulate the production of antibodies chiefly active against the antigen that called them forth in no way conflicts with the known facts in immunity. In this connection and as a striking support of the basic principle of an antithyroid serum it is interesting to quote the results of Ogata abstracted in the *Journal of the American Medical Association*, LXIX, page 77. Since the experiments bear so directly on this matter the abstract is quoted in full:

"Ogata injected rabbits with an emulsion of dog thymus, and thus obtained a thymotoxic serum which he tested on young dogs from ten to sixty days old. Control animals were injected in the same way with normal rabbit serum. The thymotoxic serum was injected subcutaneously during fifteen days. Photographs of the thymus from the dogs afterwards show a remarkable difference between the experimental animal and the control; the thymus weighing only 0.75 gm. in the former and 3.8 gm. in the control in one pair. The proportion to the body weight in the normal animal was 1:1560; in the control animal 1:376. In another group the experimental thymus weighed 1.3 gm.

and 10.2 gm. in the control, the proportionate weight in the normal being 1:1760; in the control 1:313. In addition to the atrophy and dwindling of the thymus gland, the experimental animals showed smaller and frailer bones than the controls, and their bones contained considerably less calcium and phosphates than in the controls. The serum of rabbits injected with dog ovarian tissue failed to display any action on the thymus gland. The thymus toxic serum seems thus to be strictly specific."

In principle these experiments are a direct confirmation of the writer's contention regarding the antithyroid serum. No experiments are given to show whether the antithymus serum showed any complement fixation reaction against antigens derived from other tissues than the thymus. It is quite possible and even probable that such a fixation might occur, but such a finding would in no way vitiate the specific reaction shown *in vivo* as quoted above. The complement fixation reaction is carried out under highly artificial conditions and does not give any indication as to the reactions occurring in the living animal subjected to antiserum injection. While it may be possible to obtain a fixation between kidney antigen and antithymus serum *in vitro*, the conditions are artificial in that no thymus antigen is present, and it is not valid to reason that the avidity of the antithymus serum for kidney is as great as for thymus. *In vivo* both are present and the thymus is attacked. On the basis of this reasoning it is the writer's contention that experiments showing complement fixation between thyroid antiserum prepared by the writer's method and nonthyroid antigen in no way invalidates the other evidence of specificity as shown by precipitin and agglutinin reactions, and also the digestive experiments cited above. Neither does it in any way controvert the mass of evidence accumulated during the last ten years in the application of antithyroid serum to more than 4,000 patients. To make a complement fixation experiment have any degree of validity in this connection it would be necessary to show that with two antigens present in the medium the antiserum reacted as readily with the nonspecific antigen.

The writer concludes, therefore, that the evidence at present available strongly supports his original contention that the injection of human thyroid protein into a sheep or rabbit stimulates the development of an antiserum which has highly selective affinity for thyroid antigen.

The application of such a serum in the treatment of human disease is a much more complex problem than the study of its varied reactions as a laboratory experiment. The pathological condition to which it is applied, hyperthyroidism, has in itself so many variations in its etiology, pathogenesis, and symptomatology that no just comparison from a clinical standpoint can be made between the application of this serum, and a serum prepared against a bacterial

infection such as diphtheria. No one seriously doubts at present, that diphtheria and tetanus antitoxin are well established scientific facts, but their successful application in human therapeutics require quite different technic to secure favorable effects. These differences have been appreciated as the result of clinical experience, and have not been predicted from laboratory deductions. And yet diphtheria and tetanus lend themselves to laboratory investigation more readily than hyperthyroidism. They are simplicity itself compared to the complex matters involved in the deranged human machinery of exophthalmic goitre. Distasteful as it may be to the pure scientist, it is necessary to give some consideration to clinical observation and experience in deciding what may be the value of a therapeutic agent. The writer in no way denies the necessity for the most rigid laboratory control of clinical observations, but it must not be overlooked that in the human patient we are dealing with the most highly developed animal organism, whose reactions are qualitatively and quantitatively different from a laboratory animal, presenting factors unknown to the test tube or incubator. Moreover, the fact must not be ignored that therapeutic tests on a human patient may be to some degree controlled, and also that clinical observation may win a new fact that is none the less true because it was observed in a human subject instead of a rabbit. The writer has devoted more years to laboratory investigation of problems in biology than to the practice of medicine, and knows from intimate association how prone the pure scientist is to damn the superficialities of the clinician, and knows equally well how bitterly the clinician criticises the narrow vision of the scientist. Both have a portion of the truth, but infallibility is not a gift vouchsafed to either party.

During the last ten years antithyroid serum, prepared by the writer's method, has been given to more than 4,000 human patients. These patients represent all phases of thyroid overactivity. The age limits run from 7 years to 72 years. They cover the milder forms in young women, the acute highly toxic cases, cases operated upon after a period of serum treatment, recurrent cases from operation by all the best known thyroid surgeons in this country, and the atypical cases difficult to classify. Many of these patients have been observed over a period of years, so that at this time a reasonably accurate conclusion can be formed as to the permanency of the result, as well as any possible complications that may arise from the serum injections.

It is necessary as a preface to these conclusions to discuss briefly certain formal criticisms from the clinical standpoint that have appeared during this period. The earliest of these is the brief note by Taylor, who stated in a half column article that he prepared serum in rabbits from human thyroid protein and applied this

to the treatment of certain patients with no result. The serum caused no reaction whatsoever when injected into the patient and was without therapeutic effect. Taylor states that "large amounts of the serum could be injected without the causation of any results whatever." This statement alone demonstrates that he was dealing with an inactive useless serum. The article published gives practically no details so that it is impossible to learn precisely what really was done. However, the writer made some investigation of these experiments and learned certain details which he has not been at liberty to publish heretofore. Inasmuch as Taylor's work has been frequently quoted in refutation of my work, it seems worth while to state that the writer learned that Taylor's serum was improperly made, it was used for a short time only on unsuitable patients, and the clinical evidence upon which his conclusions were based was valueless. About 25 c.c. of this serum was forwarded to the writer, who made tests in comparison with his own, and found it to be absolutely without any of the characteristic properties of a thyroid antiserum. It produced no reaction whatsoever on injection. Compared with an effective antiserum it might just as well have been salt solution.

Other criticisms, based upon theoretical considerations, have been referred to in the earlier portion of this article, but certain statements made by Dubois as a result of his work with the respiration calorimeter have been widely quoted and deserve careful analysis. The writer in no way criticises the calorimeter measurements of Dubois. The respiration calorimeter in his hands is a highly accurate machine for measuring the total metabolism, and as a result of his work we are now able to express in figures a set of facts that have been well known for some time. The fact that ponderable bodies raised above the earth's surface and suddenly deprived of support would fall again to the earth, and the greater the distance they had to fall the more rapid the final rate of descent, was a set of facts known to the common people before Newton's time, but he formulated the matter into a definite law that has become a fundamental mathematical deduction. Nevertheless it is quite probable that the soldiers of old England were familiar with the destructive effects of a heavy stone pushed from the ramparts of a castle long before that time. As the result of a few measurements, Dubois concludes that the only therapeutic measures of value in treating hyperthyroidism are psychotherapy and rest. As far as serum is concerned, his conclusions are based upon the treatment of one patient. It is dangerous to generalize from a single case. Since so sweeping a conclusion is made, and, since this has been so widely quoted, it seems necessary to add a few details. The patient in question was treated by the writer at Dr. Dubois' request. Previous to his entrance to Bellevue Hospital, he had been a patient

in three other large hospitals of the city, but his progress was unfavorable. He refused operation because he knew personally of several unfavorable results from such a procedure. After three weeks' treatment with serum he showed a ten percent reduction in his total metabolism. Two weeks later it had gone up a few points and shortly thereafter he left the hospital and came to my office for treatment. During the latter part of his stay in the hospital he was not in an agreeable frame of mind and was subjected to frequent requests to reconsider his determination not to have an operation. During the last three years he has been a private patient. Since leaving the hospital it has not been possible for him to have either psychotherapy or rest. For fifteen months he had serum injections with fair regularity and since that time he has had them about two times a month, until August, 1917, when they were discontinued. The result is that now he weighs more than ever before, 175 pounds, he has no palpable thyroid enlargement, his heart is regular and varies from 75-85 in frequency, he has a very slight exophthalmos, general strength and health good. This is in contrast to the condition of typical active hyperthyroidism during his stay in the hospital. During the last two years he has been very active. Instead of being an invalid, he is now a useful citizen. In view of these facts it seems to the writer that Dubois is without any justification in drawing the sweeping general conclusion that serum therapy is ineffective. Certainly a physician who made most careful observation of a diphtheria patient during a 24-hour period following the injection of 200 units of antitoxin would have no basis for a statement as to its value. It is quite as reasonable for Dubois to draw such a conclusion on the basis of the facts that he has published.

The serum treatment should not be used as a short cut to recovery, nor should its use lead to neglect of other measures that are known to be of service in relieving the patient.

Ten years' experience in its use demonstrates its value as an efficient therapeutic aid, but it does not answer the whole problem. Some patients with typical manifestations do not show a favorable response. Approximately twenty percent of all the various types of the disease do not benefit from serum injections. The complex pathogenesis of the disease is perhaps responsible for such a finding. Furthermore the variation in reaction shown by two patients who have similar clinical manifestations indicates factors in their serum and tissues which are as yet unknown. With eighty percent of all patients treated the serum proves serviceable.

Various plans of administering it have been tried. The dosage, frequency of injection and length of time treatment must be continued are individual matters with each patient. Furthermore its place in the scheme of treatment of each patient is an individual

matter. With some it is indispensable, while with others it appears to hasten a recovery which might be accomplished in a longer time without its employment.

When administered as directed there is no danger in its administration. Contrary to the findings of Taylor, who stated that large amounts of his serum could be given without any effect either good or bad, and thereby demonstrated conclusively that he was dealing with an inactive product, the human antithyroid serum is distinctly an active remedy. Experience gained from the administration of diphtheria, tetanus, pneumonia, meningitis antisera is in no way applicable in the administration of thyroid antiserum. It is the only serum used for therapeutic purposes that is developed from a human antigen. The beginning doses administered subcutaneously are small, in most cases from 2-4 minims. In a few instances, in very severe toxic cases, the initial doses have been 10-15 minims. Injections in most instances are given every second day, and the dose gradually increased as the subject becomes tolerant, reaching in the course of three to four weeks the full dose of 14-20 minims. If a full dose of 15 minims be given every day or every second day in the beginning of treatment, the result is almost sure to be disastrous, very severe local reactions developing at the point of injection, the whole arm will become swollen, the patient will have a temperature of from 100-102 and be most uncomfortable. With gradually increasing doses these larger injections can be made with no discomfort. Failure to follow the plan outlined has been the cause for disappointment in some instances.

The question as to whether long continued treatment will produce dangerous effects in other organs can be answered on the basis of many hundreds of cases treated from 5-10 years ago who are now in good health without evidence of disease in organs which conceivably might have been injured if long continued injections were responsible. Patients who had injections continued for a period of more than a year, who were given 100-175 injections during the course of the treatment and who have remained well for periods of 5-10 years since discontinuing the injections seem a fairly conclusive refutation of the idea that dangerous side effects have been caused in other tissues.

The medical profession has gained its experience with serum treatment almost entirely in the treatment of acute infections. The therapeutic result in these diseases must of necessity be a prompt one. In a few hours or a few days the decision is determined. The attitude of mind which is developed from such experience is not entirely suited to deal with the serum treatment of hyperthyroidism. The treatment in this condition must be long continued, covering a period of weeks and months. The earlier doses not infrequently occasion a degree of relief quite as striking as may be seen in the

treatment of diphtheria with antitoxin, but the final recovery requires months to accomplish. Hyperthyroidism is a much more difficult disease to deal with than diphtheria. More difficult because the etiology, pathogenesis and clinical manifestations are much more complex.

The medical treatment of hyperthyroidism, to be successful, requires a careful study of each patient. A simple diagnosis followed by the more or less perfunctory injection of antithyroid serum will in a small percentage of cases be followed by favorable relief, but to restore the patient to complete good health requires a careful analysis of the conditions in each individual. After a ten years' study of this condition, during which time the writer has had the privilege of studying several thousand patients, the following therapeutic measures have come to be relied upon as having value in treating the various forms and degrees of thyroid hyperfunction. The degree to which each individual patient is subjected to these measures is a matter that can be determined only by the individual conditions in each case.

1. Rest; physical, mental, emotional.
2. Diet; rigid meat free diet, and exclusion of all forms of stimulants, such as tea, coffee and alcoholics.
3. Administration of antithyroid serum.
4. Clearing up of all chronic infections.
5. Maintenance of hygienic conditions of the intestinal tract.
6. The judicious administration of small doses of iodine, always in the form of potassium iodide. This agent is not indicated in all cases, and is used only when the intense overactivity has been controlled.
7. The proper use at the right period of the treatment of suitable doses of x-ray.
8. The administration of neutral hydrobromide of quinine in a small percentage of patients during the later periods of treatment.

A detailed explanation of the application of these therapeutic measures is not within the limits of this paper. The administration of antithyroid serum is an essential part of the program. Its therapeutic usefulness and its entire harmless effects when properly administered have been demonstrated in so conclusive a fashion not only by the writer but in the experience of so many other careful physicians that it deserves a recognition which the large economic and social importance of hyperthyroidism justifies.

Hyperthyroidism is not exclusively a surgical condition, although many enthusiastic surgeons so classify it. In a recent article the writer has outlined the problem of recurrence after operation, a condition of affairs which is bound to attract more attention in the future than it does now. The enthusiasm for treating hyperthyroidism exclusively as a surgical condition is not justified by the

results. The surgeon and physician should work together. The operated patient is by no means well and needs long continued medical treatment to make a complete recovery, a fact which the surgeons are recognizing now more than before. Furthermore, the good risk from an operative standpoint can in most instances recover entirely without operation under good medical treatment. However, this is not the place to discuss the relative merits of medical and surgical treatment of hyperthyroidism.

The writer can find no reason in theory or practice for drawing any other conclusion than that antithyroid serum is a useful therapeutic agent. The many hundreds of human individuals in this country who now enjoy good health through its effects may have some weight in support of this statement.

THE CARE, MANAGEMENT, AND TREATMENT OF EPILEPTICS.*

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Throughout the ages, the nature of idiopathic epilepsy has been and still is the subject of surmise, conjecture, and scientific study. Its manifestations of a loss of consciousness and convulsion are well known. What prompts the periodic manifestations of such symptoms? Years of work upon the morbid chemistry of the bodily tissues and fluids have been undertaken without our being able to elucidate the problem of the mechanism of this convulsive disorder. The morbid anatomy and histologic makeup of the cortex of the brain has not given any decisive answer as to why the epileptic brain gives way in fits under physical or chemical assaults. In point of fact no one great biologic fault of physical makeup seems to make possible the evolution of the disorder. Probably epilepsy has many varying causes operating in even the one case at different times.

We know as a matter of fact that the epileptic as an individual is usually functionally incompetent in many bodily processes even when he appears structurally intact. A number of workers in this special field having been rather at a loss to find a new functional or structural interpretation of the disorder, several of us have undertaken to study the nature and makeup of the epileptic individual as a whole to see if there were not a fairly exact pattern defect of personality and character in the epileptic, which made him susceptible to his disorder when certain physical or mental stresses were encountered, such stresses which would be not at all potent for harm in the normal individual. From time immemorial it has been recognized that the epileptic was a rather distinct type of person in his manner and personality. Heretofore it has always been supposed that the epileptic fits reacting upon a relatively normal physical and mental makeup largely brought about this type of epileptic character. Several years ago it occurred to me to make an intensive analysis of the character and mental makeup of the epileptic individual before he had fits. As a result of this study since fortified by a very large case material it was found that the characteristics of the epileptic makeup, of supersensitiveness, ego-

*Read before the Medical Society of Greater New York, Randall's Island, October 15, 1917. The facts as here enunciated are part of the therapeutic suggestions embraced in the author's monograph, "Clinical Studies in Epilepsy," published by the Utica State Hospital, 1917.

tism and a crudely developed emotional life, antedated his seizures—in fact, dated from his birth, showing that there was a more or less marked defect of the primary instincts which were often seemingly inherited.

Given such a constitutional makeup, how did the epilepsy develop? It has long since been found that the supposed fault which caused an epileptic individual to develop his epilepsy was really trivial, but if one analyzed carefully and physical and mental makeup of such epileptics and their poor adaptive ability, plus the type of physical and mental stress which in another would hardly have been harmful at all, then it was quite possible to see why the epilepsy developed as a chronic and oftentimes enduring disease.

The next point of attack was to study more closely the morbid use which the epileptic derived from the fit itself. Psychologically it was found that types of social and family stresses were gotten rid of by the attack, annihilated by amnesia or the sting of the conflict was for the time lost. That is, whenever the stress of life in school, at home, or in business became too intense, the conflict was removed by a loss of consciousness or a convulsion. In the milder types of attacks just after the fit has ceased and before consciousness is fully restored, it is possible to obtain a mental content of ideas which show that the individual epileptic has regressed or gone back to thinking about events or times which he had great difficulty in solving to his satisfaction, and which he tries to fashion aright once more. These facts are not at all revolutionary in our science, as one might at first think when one realizes that an analogous example is shown in deliria, stupors, and manic excitements of the frank psychoses. The manner, behavior, and strength of the furor of a fit may be in many respects counted as a brief psychotic episode during which the patient labors with some of his improperly digested physical and mental past. Thus we have a rational basis of the epileptic constitution and its fit sequence, the latter being a result of a varied series of life stresses which such an individual cannot stand.

The physical correlate of this particular type of mental makeup is often a weak digestion, poor circulation, flabby muscles, defective special senses, and generally weakened vitality with poor resistance to the inroads of infections and toxins.

What may we do for such individuals? First of all, such cases do poorly at home with those who may try to understand them but who by temperament are not suited to handle such individuals. If from economic reasons a separate, normal home environment cannot be found, we must try to send them to the farm colonies to be trained, educated, and treated.

At this time I shall not undertake to outline in detail all the principal points in a drug and physical therapy for this disease,

which any of the textbooks can furnish; but tonight I wish to give a more precise delineation of the care and management of the epileptic as an individual. Indeed, this is really not new; and is in accord with the modern conception of mental hygiene and the more precise interpretation of the nature and treatment of the psychoneuroses and psychoses. It is simply a careful effort to understand the makeup of the individual epileptic and the mental mechanism of his disorder, and to apply broad yet specific principles of treatment. In making a special plea for this type of therapeutic approach, the fact is not lost sight of that sedatives and physical therapy, particularly the latter, are not without value. We wish merely to insist on the limitations of this kind of therapeutic theory. The enlarged view will be more rational and more humane, yielding not a little of value in the way of a broader psychologic and sociologic conception of this disorder.

Undoubtedly the treatment of the primary makeup of the epileptic must be our main concern, as it is a defect which antedates the seizure phenomena for years. Next in importance for treatment are the epileptic reactions shown in behavior and conduct disorders, which, when carefully looked for, can almost always be found in a case of the essential disease. These latter symptoms, of daily occurrence in the potential epileptic, often give the physician and relatives most concern even after a frankly convulsive epilepsy has become firmly established. Finally, the seizures themselves often follow episodes of stress which seem to precipitate the attacks, and these need to be given more attention in future plans of treatment. A certain degree of mental deterioration in the frank epileptic is a natural sequence of the epileptic character when care is not exercised to correct this tendency. It would seem, indeed, that the diagnosis, treatment, and prognosis of idiopathic epilepsy can be properly made in future only by taking into strict account the degree and kind of primary character-endowment of the epileptic, and its modifiability under a system of training, together with an analysis of the convulsion. Though this statement makes the fit distinctly of secondary importance, a similar view has been more or less tacitly assumed by good clinicians of the past.

To establish proper principles for the treatment of epilepsy, epileptologists must cease to give attention entirely to the occurrence of individual attacks. We shall then be in a position to make a just estimate of the extent and character of the disease and formulate a comprehensive plan of treatment. As a pure drug therapy for epilepsy already savors of quackery, so should a purely physical therapy grow more and more to be regarded in the same light.

The usual makeup of the potentially epileptic child is one of egocentricity, emotional poverty, morbid sensitiveness, and an instinctive inability to take on an adaptive social training in the

home and school. A morbid exhibition of this defect is shown in many such children by a display of rages and tantrums. These children need special training from infancy, particularly by some one specially gifted for the task. Often this is done best by some one other than the parents. So soon as the keen individualism of these children comes into contact with an exacting and unyielding environment, it is expressed in irritability. Tact must be exercised to properly handle these episodes. At one time the child may be sidetracked by directing his interest into other channels; at another he may be completely ignored, especially if the child is too observant of the effect his conduct has on the family. One should be sure not to offer bribes for a restoration of proper conduct; often such concessions are the irreparable beginnings of a downfall of discipline. If the child is to be diverted to some other interest, this should always be supplied early, before any severe repressive measure is brought to bear. In these exhibitions of a balked desire, one should look upon the child's psychic activity as a continuously out-flowing stream of interest unfortunately thwarted, which should not be blocked any more than an active mountain stream, and no tantrum should be allowed to pass without a friendly and sympathetic review of the circumstances which led up to it. To be fully effective, every opportunity for right conduct at the irritable periods must be fully coupled up with the actual personal disadvantage the child suffers from his acts. The explanatory period is often at hand long before one ordinarily thinks it is possible; several children whom I have known have been given these simple talks in their third year, with much success.

As regards the general, everyday behavior of these children, a stiffening of the will or a broadening of emotional inhibition should not be undertaken too early or intensively. Such children are usually inordinately slow in making simple or even mildly difficult adaptations, and in consequence fatigue unbelievably soon. One of my patients at six years of age could not bear even the slightest coercive direction in her work and play without complete rest and frequent day naps. Children of this type do not always show their exhaustion in simple ways; they often look pale and haggard, pupils are dilated, or they grow lethargic, sit and day dream, or slowly mount on a thin crest of hilarity which is easily broken by squalls of apparently meaningless crying; or they may make unusually rigid demands of deportment on the part of their playmates. The trained observer gets to know these signs of fatigue and is often able to lower the nervous tension tactfully by quieter play. Under one pretext or another they may be persuaded to seek rest of their own accord, after the higher level of their activity has been gradually lowered. A tantrum is not far distant in the bored or tired egoistic child, and running counter to his playmates is one

of the commonest means which he takes to break the intolerable situation.

Long before the child displays tantrums, one finds slighter but equally obtrusive manifestations of maladaptation to the simple processes of life. Often these children must be slowly inured to the unpleasant demands of hunger and fatigue, a failure of which is frequently expressed in the restless crying baby, and also to the hampering and unpleasant contact of clothing which often forces them in stereotyped positions.

The potentially epileptic child should have less insistent demands placed upon him, and for shorter periods than other children. His preference for certain types of dress should also be taken into account and yielded to so far as practicable. An equally wise attitude may be assumed toward the bath and diet. If left somewhat to self selection and direction, such difficult children much more readily mend their ways. The same principle also applies to play. The lesson derived from other children doing the conventional thing most tactfully supplies a corrective influence which a parent or nurse may not exert. Frequently an incentive to reasonable conduct once planted by the right associates bears more fruitful results than many and oft-repeated injunctions from the child's elders.

One may safely say that the method by which the child secures its first adaptations to hunger and fatigue, and to social adjustments of work and play with its fellows, should be a guide for the proper after-training of the potentially epileptic child. Sufficient data are now at hand to indicate that this primary endowment of makeup is probably always hereditary, and it often rests with us whether we shall allow it to develop to its logical conclusion in an outspoken epilepsy, or by our attitude of handling it prevent such development. A complete change of the makeup is beyond our power, but modification of it should be our main concern in future, if we wish to conserve such children from an epileptic career.

A system of ethics can be built up around almost any line of activity the child selects. One may note its presence in all. It is the attitude of approach toward one's specific surroundings that matters, not necessarily the things themselves. The incessant clamoring of the child for variety and novelty of interests is but the natural demand that is his birthright—to view as many facets of life as possible. Our concern is not to limit these novelties; the very completeness with which the difficult child may be made to experience them is the safest protection against day dreams, lethargies and like abreactions from his work and play leading to boredom and irritability, the forerunners of rages and tantrums. To establish at the earliest possible moment a self-directive government in the potentially epileptic child should be our aim. The end sought is really to have him learn to penalize himself and adjust

his own capabilities and desires to reality. Frequent psychotherapeutic talks relative to his difficulties are of greatest moment, and these can be undertaken only by someone in full sympathy and confidence with such a child.

While the scholastic training for all children must rest somewhat upon the same grounds, the goal to be won for the education of the epileptic youth must be arranged to suit his peculiar makeup. Where there is an intellectual defect coincident with an epileptic makeup one must educate this type of individual somewhat as if he were feeble-minded; sooner or later, however, there will be a distinct outcropping of the peculiar epileptic instincts that demand a modification of the school training. While this class forms a large part of institutional charges, numerically it is not so important in the general run of epileptic children. Often the purely intellectual training has to be omitted and the whole time given to tutoring the epileptic youth in social behavior. In other words, the school training should be intensively individualistic and constantly elastic. The very monotony which the feeble-minded enjoy is poisonous to the soul of the epileptic, who requires novelty and a wide range of educational appeal. Moreover, in a large percentage of epileptic youths the intellect suffers but little or no impairment, and the educational training which these individuals need is little different from that ordinarily given to normals, except that it includes adjustment to work and adaptations along ethical, moral, and social lines.

On the whole it is a mistake to approach the problem of educational training for the epileptic in its broadest sense on the old ground that he is only a little less retarded than the feeble-minded, because in reality his primary fault is his egoistic trend and an emotional poverty. These abnormalities affect his environmental rapport and often he suffers from a lack of intellectual stimulus because of a weakened attachment to reality. Simply because he is mentally retarded is no reason for his education being placed on the plane of that for the feeble-minded. If the schooling is like that for the feeble-minded it should be possible to modify its routine so as to make it adjustable to the demands of the epileptic character. The retarded epileptic has such an irregular mental-age level at best that he is not often capable of doing well in any large class teaching as does the feeble-minded.

Epileptics who have very frequent attacks can make little use of any system of intellectual training. The attacks prevent consecutive attendance at school and hence much of the education is rendered useless.

We find a system of educational training of most value in epileptics who have infrequent attacks, and have a fair intellectual endowment as well as ability to generate directed, and finally spon-

taneous, interests. Primarily the colonization of epileptics means most to these individuals, supplying a continually interesting and varied environment with all the possibilities of modification from season to season, so that monotony and boredom can be avoided.

After the above rather negative remarks as to why the epileptic should not be given the treatment of the feeble-minded, let us consider the positive, dynamic aspect of the proper scholastic training.

The system of education in the schoolroom must be an essential part of the occupational life of the epileptic, whether or not he recovers from his epilepsy. His educational training needs to be coupled up with the occupations in which he is engaged and in which he is interested. For instance, the youth who is occupied in agriculture should have a system of book instruction and class-work that will make for a further elaboration and understanding of the daily duties grouped around this work. It is obvious that the maximum of school training shall be concrete rather than of an abstract nature, and along the lines in which the patient exhibits the keenest interest and most distinct capabilities. Abundant illustrations show that the type and manner of school training should be properly adapted to the peculiar makeup of the individual.

The greater part of what has already been said applies to the training of those children who may also show frank epileptic seizures during early childhood. The actual protection of the mental and physical integrity of the frankly epileptic child becomes doubly necessary when attacks have once commenced. The child usually needs to be withdrawn from the average school, which often furnishes the stress that is too much for him. A period of carefree existence should then be maintained sufficiently long for him to recover his mental balance and the proper regulation of physical health. Pallor, nervousness, disturbed sleep and similar symptoms are usually removed quickly under such a let-alone treatment. At this stage the real trial begins, because from this point on we must have two motives in operation in handling the patient: first, to remove all the too stressful situations which the patient has reacted away from in the attacks; and secondly, to begin a careful system of training in slowly accustoming the patient to types of stress which he must get used to if he is to make a proper adaptation in life when he has recovered from his more gross epileptic manifestations. The reconciliation of these two motives in a training treatment calls for the greatest discernment and tact, and often this can be initiated only away from home—especially away from either a too harsh and unsympathetic discipline, or a too inconstant and overindulgent one.

There is a parallel in the training treatment of the frankly established epileptic and that of the epileptic child before the disease has

become established. With the former, however, efforts must be redoubled and placed on a more adult plane. One should not rest content with the removal of a stress from the life of the epileptic youth, for this is only a preliminary treatment. If this let-alone principle only is followed, the situation which will soon develop will be but little less intolerable for all concerned than the original condition. If left to himself, the frank epileptic soon occupies himself with day-dreaming, lethargies, and all sorts of idle dissipations, which in their turn often beget more irritabilities and epileptic reactions.

One should study how best one may help the epileptic to objectivate his interest, in work, study, and play in accordance with his ability. To carry this into effect, the closest scrutiny of his emotional and intellectual interests is necessary. His environment, which in most instances may have been reduced in social demands, ought still to offer sufficiently varied outlets from which he may choose a number of interests and amusements. Probably no greater mistake is made than to tell epileptic individuals to betake themselves to the country and there allow the matter to end. Many epileptics almost at once have an increased number of attacks, and, what is still worse, begin to deteriorate mentally and emotionally through lack of proper stimulus. There must be a certain novelty in the occupations and amusements, and not a few to select from; hence the importance of epileptics being in a country environment which is not too dissimilar to what they have been accustomed to, only the tempo, as it were, is to be reduced. Some of the large public colonies are richly supplied with such potential advantages, but unfortunately for economic reasons a number of highly trained and gifted attendants and physicians are not at hand to assist these more sluggish epileptics to get the proper start in congenial work.

All frankly pronounced epileptics are doubly handicapped by their natural antisocial tendencies as well as by the epileptic seizures themselves. Such a temperament is a direct hindrance to the epileptic taking up a healthy interest in any life offered him. In the absence of a spontaneous interest, the remnants of former ones must be pieced together or new ones induced. This can be effected only by actually living in close contact with the patients, assisting and encouraging them to start the cold and uninviting task anew each day. Often before work and study can actually be put in operation the epileptic individual must be given many kindly explanatory talks concerning the treatment, the common sense view taken of his disorder, and the method planned for its riddance. The friendly association which many another neurotic or psychotic may have with the nurse and physician plays but little part in dealing with epileptics. The very nature of their makeup precludes this, and the treatment is, therefore, at times most disheartening. Of

course, the unlikability of such epileptic individuals, and the physician's and nurse's failure to transfer their own deep interest to them, are proverbial. The general dislike of the epileptic to perform sustained labor day by day is well known, and the faithful attendant must himself participate in the activities outlined and in most instances must take the lead until such time as it can be borne without direction and guidance.

We have now laid down the general principles for modifying or correcting the character makeup of the potential or the frank epileptic. Of what value can a study of the attacks or other explosive or tantrum episodes themselves furnish us in treatment? It has been found, as already stated, that the mental upsetting factors of attacks are capable of analysis and lead us to plan the patient's life so that he may avoid these mentally indigestive episodes, by simple explanatory talks and suggestions the patient may be taught what some of his innate defects are and thus gain his co-operation to overcome them or to avoid them. When one may not get a mental content while the patient is but partly conscious after the attacks for a more precise application of mental therapy, one can analyze the irritable periods themselves so that every patient may supply data which the physician may use for the patient's general social, physical, and mental betterment. Just as we almost invariably find attacks of vertigo and petit mal before a history of grand mal attacks, so we usually find a period of bad physical and mental adaptation antedating all frank epileptic seizures and often these may persist even after seizures have ceased, showing that the wise therapy for the idiopathic epileptic is that for a particular person with a bad adaptation to all the affairs of ordinary life. The following letter from the mother of one of my little boy patients who has not had any attacks for six years and who is now twelve years of age, illustrates this point and closely indicates that the stress of mental and social adaptation employed for this boy is still a little too strenuous. The mother writes as follows:

"W. still continues to keep very well and has overcome a great deal of his nervousness. He plays much better with a number of children than he used to. He eats almost everything without harmful effect. Last December (1916) the teacher who gave him private lessons was unable to teach him any longer, and as we could not find another in the village we decided to try him in the public school. He got along very nicely and this year was promoted to a higher grade. Occasionally, perhaps once in a month or six weeks, he has a day when he seems so very tired and it is really impossible for him to do anything right. He cannot remember his errands and cannot do even his examples, and arithmetic is his best study. I have to keep him out of school those days and next day he will be all right and nearly always gets good marks. I cannot account in any way for these bad days."

Finally we may conclude that idiopathic epilepsy is a complex in causation. We know that there is usually present a type of makeup which I have called the epileptic constitution, that when such individuals are placed under undue mental or physical stress actual epileptic fits occur, and that our chief concern must be directed in overcoming or correcting the constitutional makeup of such individuals. The attacks are not infrequently preceded by special stressful episodes which are for these particular persons just as incapable of mental digestion as a too high proteid diet or any other indigestible food for the gastrointestinal functions. Psychotherapeutic talks of a simple, commonsense character often teach our patients how to avoid or handle these precipitating causes for epileptic reactions. The therapeutic suggestions for a mental therapy in essential epilepsy would be to overcome, by proper training and education, the earliest beginnings of epileptic reactions. More particularly should the training be directed toward eradicating as far as possible the defective instincts shown in egocentricity, supersensitiveness and rigidity of adaptation to the home and community. The epileptic may be shown and taught to find a spontaneous outlet for his keen individualistic desires and thus manufacture his own interests in a healthful environment suitable to his needs and capacity.

THE PASSING OF THE MEDICAL PRESENT.

BY J. L. TRACY, M.D., Toledo, Ohio.

II.

In the experiences of a physician there is enough to keep him humble if he will but take the offered hint. Some study of the matter of humility is required, though, as there are two aspects of the virtue of modesty. Each of the aspects has a very practical bearing. For instance, it confuses a little to stop and think that worth and modesty are not always synonymous terms when applied to a physician. No more, though, does the parade of self-sufficiency necessarily spell out ability. It is very true that genuine modesty is an honor to the profession when exemplified by the physician, but even such modesty can be overdone. In the long run there is the most of decent respect for the modesty that continuously suggests the mixture of a whole lot of backbone. The other kind of modesty is likely to very quickly get loaded up with some of the sins of other people. To be—profitably to all—humble and modest as a physician often means the very frank analysis of the motives of those with whom the physician has to do. It is manifestly a very difficult undertaking for a single individual to try to be the only humble one in the crowd!

Probably one of the times when circumstances suggest humility to a physician in the most emphasizing way is when, "after all is over," he puts the cork back into the hypodermic tablet tube, unscrews the needle and threads the stylet into it, cleans and dries the piston of the syringe, puts all into the case and turns and leaves the room. The last hypodermic injection had most likely not been given more for the patient's benefit than as assurance to those in attendance that "everything has been done that could be done." Probably at that time he thinks of himself as the representative of "socalled" skill. Humility!

All this is in accord with the pedagogy that says, "Teaching is not putting something new into the mind, but bringing to the surface undeveloped function." In the practice of medicine both the teacher and the lesson often present themselves when least expected. Out of the unlooked for there one day came a lesson to me. I learned the lesson; in fact, metabolized it. Up to that time I had flattered myself that when mere words was needed, I was equal to the emergency, *always tried to say something equal to the occasion.*

A life insurance agent made an appointment for me to examine

Mr. Smith at 11:30 a. m. out in the suburbs. At that time of day in the suburbs the man in the factory slips home for his dinner between whistles. At precisely 11:30 his wife has the food prepared on the stove and hot, ready to serve. It's an anxious responsible, exacting time for the wife. The examination appointment was timed to catch the man as he reached home. The examination was to be made while he was going through the process of washing up and while the wife was fretting for fear the food would get cold; and very often, too, while both husband and wife were none too desirous of having "protection to wife and home" forced on them. Indeed it was very generally the case that the agent was more anxious to have the examination made than the "applicant" was to be examined. . . . Exactly on time I tied my horse in front of Mr. Smith's home. (The lesson was learned back in the horse age.) The shades were down, which fact augured well for the probable indifference of Mr. Smith. I rang the bell, and while awaiting an answer a good Samaritan woman next door raised a window and told me that "Mrs. Smith was at her mother's, and that Mr. and Mrs. Smith were to have dinner at the home of Mrs. Smith's mother." She said "Mrs. Smith's mother lived up the street on the right-hand side, just where the street made the turn." She didn't know the street number, but said "I couldn't make a mistake, as the house was right in the bend of the street." I didn't tell her so, but I thought to myself that she was not acquainted with my ability to make mistakes. Just as I expected, I found two houses where she said there would be but one, and either one of those houses was as much in the "bend" as the other. Even at that time in my life the value that I had learned to put on my judgment under such circumstances was such that I had adopted the practice of carefully deciding which was the more likely to be the right thing to do, and, after I had made the decision, of doing the exact opposite. It would have been easy if the plan had always worked. But it didn't always do it. It didn't in this instance. I noted the bend and the locations of the houses, satisfied myself which was more particularly in the bend, and then marched up the steps to the other house. I could smell food cooking as I went up the steps. I knew the state of mind of the housewife at that time of day, and, being naturally timid, I felt more than half-beaten to begin with. Through the glazed door I caught a glimpse of the living room, beyond that the dining room with table spread, and a swing door that led to the kitchen. After I rang the bell I knew what was going on in the kitchen, and after a while I saw a woman about 20 years old coming. The fingers of one hand were arranging the back hair, and those of the other hand were smoothing out the folds of a white apron that was trying to cover up the kitchen apron. I could read in her face, "No agents wanted," and, in fact,

"No anything else." I asked her if Mrs. Smith was there, and she very promptly replied that "She was not, and that she did not know anything about Mrs. Smith." Then her womanly curiosity got the advantage of her, and, instead of closing the door in a half second as she had intended to, she waited an instant to find out a little more about Mrs. Smith. As politely as I could I apologized for disturbing her, and if I had stopped then it wouldn't have been so bad. But up to that time I hadn't learned to stop. But remembering what I had been told up the street, I was determined to convince her that I wasn't as foolish as I was feeling. And so, after apologizing I said to her, "But you are Mrs. Smith's mother, are you not?" No one in my place could have seen anything to laugh about. And anyone who could have seen the expression that came over the face of the young woman, and who could have heard what she said to me, would have been very sure that she had not seen anything funny either. I told the company that if I ever examined Mr. Smith, the examination would be made in my office.

Among fifty average men there can usually be found one who has the mental makeup that will enable him to render helpful assistance in caring for the sick. There is one man in a hundred who can remember directions for giving medicine for as long a time afterward as it had taken to give the instructions. Apparently there are forty-nine or ninety-nine men who are entirely engrossed in the rush and drive of the world to one man who gives any thought to maintenance and repairs. This difference in views that men take of life is worth looking into a bit. Possibly Nature has a hand in it? Possibly the matter of occupation is not left to choice? Maybe Nature watches over evolutionary ends, and sees to it that world progress is not impeded by making a physician out of business man's stock, and sees to it, too, that the world machinery is not wrecked by letting physician's stock get into business?

FIRST AID.

In a new country the scenes shift rapidly. The description by the parents of conditions surrounding them and the relation of experiences common to their early life are likely to be looked on by their children as the imaginary tales of senility. Fifty years is the span of history of the forest that used to be. The first "road" in a forest meant that a swath sixty feet wide had been cut through the woods. In starless nights between the tree tops on either side there appeared resting upon the inky darkness below a blackish gray streak of nothingness. This gray streak is as wide as the swath through the woods, and by keeping in the middle of the streak the driver knows that his horse was midway between the ditches. These roads were years before anyone thought of having lights fastened to a buggy.

From the other end of such a road six miles long a man came such a night for me to go to see his sick wife. They were alone in their home. I explained to the man how the medicine should be given. I had put out my horse and was getting into bed again when someone came to the front door. The man had followed me in to have me tell him again how to give the medicine! This is neither the time nor the place to moralize. But as I see it now and think of the probable nicety of the diagnosis and of the probable value to the woman of the prescription, and then try to weigh a devotion that would take a man through twenty-four miles of such a drive seeking help for his wife, I am led to the belief that this was a case where devotion is its own reward.

I have read of homes in which the man of the family thought only of himself. The other members of the family were spoken of as knowing no better than to stand off and simply look on. In such families there nevertheless was said to be a feeling that at least took the place of love for wife and children, and of love for husband and father. In such families the man ate his meals alone. He ate what he wanted and all he wanted, and the wife and children afterward ate what he had left. The principal enjoyment of the food that the others had came to them from watching the man eat. Everything else in the home was in harmony with this idea of dictatorship in the man. It is needless to say that the ideas of this man and the ideas of the other members of those families were not American ideas. They were representative of the lack of vision of the ideal in some barbaric time. Of course, back in those times a woman did not know enough to vote.

THE CLEANLINESS OF NICETY.

I have had the privilege of studying one such home. In that home the man was the whole thing. He ordered such food as he himself liked best. At the table he was waited on by his wife until he could eat no more. He then sat back and smoked his pipe for the delectation of his wife and children as they proceeded to make a meal of the food he couldn't hold. I personally knew this family for years. Lager beer exacted heavy toll of the family. It was interesting to watch the effect of the public schools on the children. In the first grades it looked as if civilization would win out, but the children soon dropped out of school and finally grew up to take a place in the community on a lager beer level.

The man really had regard, of a certain kind, for his family, and even had that which might be called affection. But he was conscious of being lord over all. Mixed with or added to his other qualities he had peculiarly fastidious ideas as to certain propriety forms. He had a fine sense of cleanliness. Whenever he happened to be home at the time of my visit he always took on himself the

responsibility of providing me with the spoon and glasses that I asked for. His wife was a cleanly housekeeper, and the dishes on the shelf looked spotless; but to convince me that he knew his business, and to show me his superiority over the rest of the household he always carefully wiped and polished the dishes with his red bandana handkerchief that he took from his hip pocket!

SYMPTOMATOLOGY.

The condition known as hyperchlorhydria does not mean the same thing now that it did thirty years ago. The condition is doubtless the same now as then, but the thoughts that come to one now while examining such a case are different.

The smallest 15-year-old girl that I ever treated was one whom I first saw thirty years ago. Just what caused the one dwarf in the family, I never knew. As compared with the other members of the family, she was, however, a dwarf only physically. Sometimes I have thought that, mentally, she was superior to the rest of them. She came to me because of hyperchlorhydria. I think her stomach could secrete and excrete more acid than any stomach I ever had to do with. After a while I learned how to shorten up the attacks. Greatly against her wishes she married a man whom she always speaks of as "Him." Marriage did not cure the hyperchlorhydria, and during all of the years I have had care of her I have prescribed for her a good many times. I have learned the order in which she names the various distressing phenomena of the attacks. Her story—like the audible prayers of some people—has not varied the least bit in ten years. In her attacks there is always present plenty of that which is commonly called borborygmus. In her statement of the case she leaves the description of this feature of the trouble to the last, and, as sort of climax, concludes her story by saying, "Everything is a-bummin' around in my bowels!"

Democracy is a big word. Whatever democracy really means, it is said to be coexistent with humanity. It weaves itself into history. Possibly it is the loom of history? Anyway, it is a thing to juggle with. Men juggle with democracy, and democracy juggles with men. Democracy juggled and was juggled with in our new country times of forty or fifty years ago. In those times democracy was so juggled with that the less of anything else there was to man the more of democracy there was said to be in him. On the other hand, democracy so evened up by juggling that, whenever a congenial idea got into the crowd, the idea was a go. Congeniality in such surroundings meant a something for nothing proposition. The "Greenback" proposition of that time was such an idea. The salary and fame of office was the prize held up by democracy to democracy as reward for fealty to the idea. Democracy juggled,

and the man in the community who had had the least experience in handling money of his own was elected mayor, as the representative of the national finance idea.

SCIENTIFIC MEDICINE.

Not everyone in those times took a daily paper. There were a good many people who enjoyed being read to. Dignity of office, as a matter of course, showed up in the mayor's taking the paper. One summer evening, on the steps of the meat shop, he was reading to the crowd the details of a murder that had been committed in the city. The reporter had done his best to give a pen picture of the corpse as it laid on the slab in the morgue, and when the mayor came to the word "able-bodied" it was too much for him. He stopped and spelled out the word, dividing the syllables, "ab-le-bodied." He pronounced the word thus fixed up: a as in hat, o as in hoe, i as in high; studied over it a minute, and told his audience that "he didn't know what the word meant, but he supposed it was some dang medical phrase!"

THE CHEMISTRY OF TRANSUDATES AND EXUDATES, WITH REFERENCE TO THEIR NONPROTEIN NITROGENOUS CONSTITUENTS.*

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Few, if any, examinations appear to have been made up to the present time for the nonprotein nitrogenous constituents (total nonprotein nitrogen, urea, creatinine, and uric acid) of transudates and exudates. Otori¹ in his examinations of transudates and exudates for urea found 13 mg. per 100 c.cm. of fluid in exudates and 15 mg. per 100 c.cm. of fluid in transudates. Galdi and Appiani² demonstrated varying amounts of uric acid in transudates and exudates, their figures varying from 2 to 8 mg. of uric acid per 100 c.cm. of fluid. Other substances have also been found in transudates and exudates; thus Moscatelli³ found allantoin; while amino-acids, ammonia, etc., have been demonstrated by still other investigators.⁴ A reducing substance has also been found in these fluids. The presence of sugar was discovered by Pickardt,⁵ who found a percentage varying from 0.029 to 0.14.

In the investigations here reported fourteen pathological fluids (eleven from the chest, one abdominal, and two fluids from subcutaneous edema) were examined for total nonprotein nitrogen, urea, uric acid, creatinine, sugar, albumin, and chloride content.

Methods.—The nonprotein nitrogenous constituents were determined according to the methods of Folin and Dennis and coworkers, as described in a previous paper.⁶ The sugar determinations were made with Meyers'⁷ modification of Benedict's method. The chlorides were estimated after removal of protein by the well-known Volhard-Arnold⁸ method, while the albumin content was determined by Purdy's⁹ centrifuge method.

Discussion.—The results of examination are shown in the accompanying table. In the eleven chest fluids examined the nonprotein nitrogen content varied between 18 and 46 mg. per 100 c.cm. of fluid, the average being 29.3 mg. The amount of urea varied between 8.5 and 32 mg. per 100 c.cm. of fluid, the average being 17.3 mg. The uric acid content varied from a trace to 10.4 mg. per 100 c.cm. of fluid, the average being 3.5 mg. The creatinine total varied from 0.5 to 6.9 mg. per 100 c.cm. of fluid, the average being 1.9 mg., and the sugar content of the fluids varied from 0.066

*From the Pathological Department of the German Hospital and Dispensary, New York City.

to 0.58 percent. The chloride content of the chest fluids, however, was fairly constant, and varied between 0.60 and 0.74 percent, the average being 0.63 percent. The albumin content varied between 0.52 and 4.6 percent.

The average concentration of the nonprotein nitrogenous constituents, sugar content, and chloride content are about the same as those of the blood. In two cases the nonprotein nitrogenous constituents are increased, the blood in one of these cases showing retention of waste nitrogenous constituents. Both of the fluids were obtained from nephritics. In two other instances the sugar content of the fluids was high, the fluids having been obtained from patients suffering from a severe diabetes.

In one abdominal fluid the nonprotein nitrogen was 48 mg.; the urea, 20 mg.; the uric acid, 2.4 mg.; and the creatinine, 2.0 mg. per 100 c.cm. of fluid. The sugar content was 0.07 percent and the chloride content 0.7 percent. In this case the nonprotein nitrogen and urea of the blood was slightly lower, and the uric acid and creatinine was somewhat higher than that of the abdominal fluid.

The fluids from edema of two nephritic patients with retention showed an increased concentration of nonprotein nitrogenous constituents. The nonprotein nitrogenous constituents, with the exception of the creatinine, was higher than that of the blood.

Summary.—Fourteen pathological fluids—eleven from the chest, one abdominal, and two from edema—were examined for total nonprotein nitrogen, urea, uric acid, and creatinine.

In the eleven chest fluids the chemical examination for nonprotein nitrogenous constituents gave the following average results per 100 c.cm. of fluid:

Total nonprotein nitrogen, 29.3 mg.; urea, 17.3 mg.; uric acid, 3.5 mg.; creatinine, 1.9 mg.

In two cases of nephritis the nonprotein nitrogenous constituents of the chest fluids were increased, while in two cases of diabetes the sugar content was increased.

In one abdominal fluid the nonprotein nitrogen and urea were slightly increased.

In two cases of nephritis with retention the fluids from edema showed marked retention of all the nonprotein nitrogenous constituents.

CONCLUSIONS.

While the number of cases presented is small, they show very definitely that the nonprotein nitrogenous constituents of transudates and exudates are comparable with the nonprotein nitrogenous constituents of the blood, and that they are increased in nephritis with retention, while the sugar content of such fluids is increased in diabetes.

NONPROTEIN NITROGENOUS CONSTITUENTS OF TRANSUDATES AND EXUDATES.*

Case No.	Nature of fluid	Sp. gravity	Albumin percent	Sugar percent	Chlorides as NaCl percent	Urea N. mg. per 100c. cm.	Uric acid mg. per 100c. cm.	Creatinine mg. per 100c. cm.	Disease	Remarks
2759	Chest fluid.....	1.016	2.6	0.144	0.62	18	3.8	2.0	Myocarditis.	Pulmonary congestion; effusion into right chest; urine contained albumin, pus, and red corpuscles.
1953	Chest fluid.....	1.015	3.1	0.144	0.60	36 26†	4.2 3.3†	1.1 1.1†	Pleurisy with effusion.	Mild chronic nephritis; urine contained albumin, hyaline and granular casts; phenolsulphonethalein, 45 percent.
1526	Chest fluid.....	1.008	0.52	0.10	0.72	21	8.5 1.8	1.5	Myocardial insufficiency; mild nephritis.	Urine contained albumin, hyaline and granular casts; phthalein, 34 percent.
2664	Chest fluid.....	1.017	1.8	0.082	0.60	26	3.8	1.3	Pleurisy with effusion.	Urine negative.
2602	Chest fluid.....	1.012	0.85	0.132	0.62	25	9.0	1.7	Endocarditis.	Influenza.
3024	Chest fluid.....	1.019	3.6	0.236	0.74	26	3.8	0.5	Pleurisy with effusion.	Urine negative.
1671	Chest fluid.....	1.021	4.6	0.072	0.62	22	trace	2.4	Chronic pleurisy.	Incipient tuberculosis.
5501	Chest fluid.....	1.018	3.1	0.080	0.66	25	trace	1.0	Pleurisy with effusion.	Urine negative.
2997	Chest fluid.....	1.011	0.60	0.46 0.54†	0.60 †	43 48†	8.8 14.8†	1.1 2.9†	Chronic nephritis; uremia; cardiac decompensation; diabetes.	CO ₂ combining power of blood plasma, 36 volume percent; phthalein, 22 percent; urine contained albumin, sugar (5 percent), many casts, and pus cells; patient irrational, semi-coma; died.
1415	Chest fluid.....	1.013	0.80	0.58	0.60	46	10.4	6.9	Myocarditis; nephritis; diabetes.	Urine contained albumin, sugar, and granular casts.
158	Chest fluid.....	1.018	1.8	0.066	0.64	35 40†	2.6 4.0†	1.7 2.4†	Tuberculosis; pleurisy; chronic nephritis.	Urine contained albumin (trace) and occasional casts; phthalein, 38 percent.
373	Abdominal fluid..	1.017	1.9	0.07	0.70	48	2.4	2.0	Inoperable carcinoma.	Urine contained albumin and pus cells; phenolsulphonethalein, 30 percent.
6164	Fluid from edema.	1.007	0.08	0.13	0.60	39† 70 31†	3.3† 11.4 6.1†	2.6† 2.3 4.5†	Nematosis. Myocarditis; lues; nephritis.	Urine contained albumin and many casts; phenolsulphonethalein, 34 percent; edema of extremities.
3164	Fluid from edema.	1.005	0.06	0.03 0.132†	0.74 †	118 100†	14.2 7.3†	4.5 5.5†	Chronic nephritis.	Urine contained albumin, casts, pus, and red corpuscles; phenolsulphonethalein, 5 percent; patient irrational, semicoma, uremic

*Cases from Medical Department.

†Blood analyses.

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CURRENT NOTES

THE GENERAL PRINCIPLES OF WOUND CLOSURE AS ADOPTED BY THE INTER-ALLIED SURGICAL CONFERENCE.—General principles guiding the treatment of the wounds of war were laid down by the Inter-Allied Surgical Conference held in Paris during March and May, 1917, and those dealing with primary and secondary closure of wounds, and the place of laboratory methods in determining the time to do so, may be recapitulated here in view of their great importance. The text runs as follows:

Speaking generally, every wound of war should be regarded as either contaminated or already infected.

The aims of treatment should be: (a) To prevent the development of infection if the wound is merely soiled or to sterilize it if infection has already developed. (b) To close the wound secondarily by suture when "clinical" sterilization has been obtained.

The general rule governing the treatment should be free opening up of the cavity, combined with resection of all contused and contaminated tissues and removal of all fragments of clothing or other foreign bodies. No deviation from this rule is justifiable except in certain instances of apparently clean wounds, and then the closest after-attention is essential.

The procedure above outlined may be followed in some instances by primary closure of the wound, notably in the case of wounded joints. Primary suture is justifiable only when the wound is of some hours' standing (at the most eight hours), and under circumstances which allow the patient to remain under the observation of the same surgeon for fifteen days.

If primary closure be not attempted, secondary suture should be performed when the "clinical" sterility of the wound appears to warrant it.

The progress of the wound should be systematically controlled by a series of bacteriological examinations; thus a bacterial chart may be usefully constructed and the degree of sterility determined.

When circumstances demand the prompt evacuation of patients after the primary cleansing operation, a form of dressing capable of providing a continuous antiseptic action during the period of transport is desirable. Further researches in the direction of the most suitable form of dressing are highly desirable.

Several methods of progressive sterilization of the wound are available, which permit of habitual resort to the method of secondary suture.

THE PLACE OF LABORATORY METHODS.

An experienced bacteriologist should be attached to every surgical unit of importance, together with capable assistants and a properly equipped laboratory.

In the treatment of wounds of war intimate collaboration is necessary between the surgeon and the bacteriologist. The latter should observe the patient's wounds himself, and discuss with the surgeon the researches to be made and the course that should be taken.

The researches likely to prove most generally useful are bacteriological, cytological, and humoral.

The researches should not be restricted to a narrow scope, but, as a general rule, the following directions are suggested as likely to prove fruitful: (a) The bacteriological condition of wounds immediately after their infliction. (b) The bacteriological condition of wounds before and after surgical intervention, also before and after a prolonged period of transport of the patient. (c) The bacteriological condition of wounds which continue to suppurate, or of those in which complications occur during the course of healing. (d) Bacteriological control of the progress of sterilization of wounds with a view to determining their fitness for closure. (e) Bacteriological and biological control observations of the course of healing of wounds, made with a view to determination of the most efficacious methods of treatment. (f) Examinations of the blood; cultures, counts, tests of coagulability, investigation of defensive

properties, the indications for transfusion of blood. (g) Special infections of certain anatomical regions; joints, serous membrane, connective tissue, muscle, brain, cerebrospinal fluid; bacteriological, cytological, and humoral examinations. (h) The general indications for and application of vaccine therapy.

In addition to these laboratories attached to surgical units to aid in the ordinary practical treatment, laboratories for scientific research and the study of general questions of military surgery need to be created, or, where already existing, to be more highly developed.—The Lancet, January 26, 1917.

A NEW KIND OF SELF-INFLICTED INJURY.—Professor Ascarelli has recently drawn attention¹ to a form of lesion resorted to by recruits in order to evade military service which he thinks has hitherto escaped general observation. It is most frequently met with as a periarticular condition in the knee, ankle, or wrist, and presents the appearance of a uniform or nodulated swelling, having a bluish-red mottled tint, slightly hot to the touch. Palpation discovers that the swelling is strictly limited to the soft cutaneous or subcutaneous tissue, and is made up of large nodules varying in size from a nut to an apple, of round, oval, or irregular shape, and hard elastic consistence. These nodules are freely movable over the subjacent tissue and adherent to the overlying skin, which is involved in the process by slight inflammatory signs; they do not change their shape after hot fomentation or massage, and are not painful when scientifically tested, except in the early stage of their evolution, despite the fact that for obvious motives pain is generally complained of. As the result of his investigations, and from the confessions of the patients, Professor Ascarelli is able to affirm that these nodules are produced by the single or repeated injection of mineral oils, especially liquid paraffin. About 2 c.cm. are injected deeply and the injection is not absorbable, producing a limited inflammatory action in the tissues, almost always without sepsis, and resulting in an area of induration and permanent sclerosis, all trace of the puncture speedily disappearing. The absence of any general symptoms, the characteristic and strictly localized appearance, and the course of the lesion render the condition so typical that it cannot be confounded with any other, such as cellulitis, bursitis, or autoconstrictive edema. It constitutes no bar to active service, but the question of ultimate absorption of the nodules has as yet not been satisfactorily determined.—The Lancet, January 26, 1917.

DERMATOLOGIC PRESCRIPTIONS CONTAINING DISSOLVED SULPHUR.—Louis Bovy, whose treatment of psoriasis by hypodermic injections of sulphur was recently mentioned in these columns, has published some prescriptions of general interest in which sulphur is exhibited in solution. To obtain this result he avails himself of the little known property possessed by certain substances, notably camphor and oil of sesame, of dissolving notable quantities of sulphur.

The following are selected as examples:

Sulphur, precipitated.....	1 gram.
Camphor, powdered.....	3 grams.
Salicylic acid.....	1 gram.
Zinc oxide.....	20 grams.
Vaseline.....	30 grams.

The solution of sulphur for hypodermic injection in psoriasis is of the following composition:

Sulphur.....	0.20 gram.
Eucalyptol.....	20 grams.
Oil of sesame.....	80 grams.

¹Il Policlinico, Practical Section, November 25, 1917.

The sulphur and sesame oil are mixed and heated to solution on a water-bath; the solution is cooled and the eucalyptol added.

The usual amount injected is 5 c.c., which introduces for absorption 1 cg. of sulphur, a dose relatively large, having regard to the generally admitted insolubility of sulphur. Nothing is easier than to incorporate dissolved sulphur in a given excipient if it is first dissolved in oil of sesame. The sulphur is then more active and infinitely less irritating than when applied to the skin in the precipitated form in simple mixture with some fatty body. Bovy has obtained excellent results by combining, in an ointment, sulphur, tar, and oil of cade in the treatment of inflammatory dermatoses, once the early acute stage has passed off:

Sulphur, pure precipitated.....	2 grams.
Camphor.....	6 grams.
Oil of sesame.....	10 grams.
Oil of cade.....	10 grams.

These are warmed together gently in a bain-marie until solution is complete, and then are added 10 grams each of tar and eucalyptol, 15 grams each of zinc oxide and carbonate of bismuth, and 15 grams each of lanoline and vaseline.

Eczema, acute or chronic, dermatitis due to external agents, irritated psoriasis, the eczematous effects of itch, and sycosis are all greatly benefited by the use of this preparation.

Another very simple preparation, which is useful in the same conditions for which Alibour water is generally recommended, is a cream made by mixing 20 grams of Alibour water with 10 grams of lanoline.

For the local treatment of obstinate pyodermitis, mucous patches, soft or hard chancres, and Vincent's angina, Bovy recommends a mixture of equal parts of 2-percent solutions of methylene blue and nitrate of silver. The parts are swabbed with pledgets of absorbent wool soaked in this solution.

For use in the treatment of ordinary or trichophytic sycosis, trichophytic affections of the skin, impetigo, impetiginous eczema, and infectious dermatitis, he strongly recommends an ointment containing

Iodine.....	1 gram.
Xylol.....	10 grams.
Vaseline.....	100 grams.

The iodine is dissolved in the xylol, and the solution mixed with the vaseline to form an ointment. This preparation is hardly at all irritating, and its use can be continued for several days in succession, with occasional intermissions, when a milder cream or ointment is applied. It is particularly valuable in the treatment of infections of the beard and scalp.—*Le Progrès Médical*, October 13, 1917; Abstracted from *The Practitioner*, December, 1917.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

MARCH, 1918.

No. 3

EDITORIAL.

UNIVERSAL TRAINING.

In a work, fathered by the Carnegie Foundation and evidently prepared during peace time, though published after the outbreak of war, it was sought to establish by historical and statistical research the grave disadvantages of militarism. But at the end of that work there was a piece of statistics which it must have highly tried the impartiality of the writer to publish. After purporting to show that the spread of venereal disease was a direct and inevitable consequence of army life, the writer quoted figures—the latest then available—showing that syphilis was most prevalent in the army of the United States, the least militarized of all great nations, with the army of the United Kingdom coming second, and that it was least prevalent in that of the most militarized nation—Germany. The difference was enormous.

To what can such a difference be attributed if not to the effect of a military training?

Since the draft law has been in operation, we have been told that the draftees have shown a higher percentage of venereal infection even than the old Regular Army. Now, had this statement referred to European conscripts, one might have suspected a fallacy, in that they would have been for more than two years exposed to the notoriously increased chances of infection due to the presence, in their countries, of an army on active service. But these recruits were drawn from a population which had not been in contact with a warring army, and they must therefore be taken as a just sample of the young manhood of the States.

If this is so, and I see no escape from the disagreeable conclusion, it is high time for this nation to ask itself whether the system or want of system in the disciplinary training of its young

citizens with which it has hitherto been content can be allowed to continue.

Probably no movement of modern times was received with such universal approval as the Boy Scouts. Though originated by Baden-Powell in consequence of the success obtained by Lord Edward Cecil in the employment of boys during the siege of Mafeking, it was, nevertheless, professedly nonmilitary in its spirit. This was true at any rate in Great Britain, though elsewhere the military character and objective of the institution were but thinly disguised.

The main objects aimed at, apart from the obvious ones of physical training and recreation, were to inculcate the ideas and habits of self-control, responsibility, service, and sacrifice. You know that every boy scout ties a knot in his cravat each day, which he may not undo until he has performed some act of disinterested service. It may be said that the Boy Scout movement aimed at doing for all the boys of England what the great Public Schools (*sensu anglicano*) had done for the more favored classes.

But there has been another result, whether anticipated or not I cannot tell, and that is a democratic result. While the government of the United Kingdom is effectively democratic, the social system is essentially aristocratic. That the barriers of class have been broken down by this war, perhaps never to be set up again, is a truism, but what is not fully realized is that the Boy Scout movement had already weakened them. Not only is this because, in theory at least, no class distinctions were recognized in the organization of the patrols, but because, at the annual camp of selected scouts, there met on a footing of entire equality, peers and proletariat. The opportunity to attend such a camp was equally open to newspaper boy and to duke's son. Efficiency was the only passport: social rank availed nothing.

What has been done for the boy must be done for the young adult. An eloquent editorial in *The Modern Hospital* for January has admirably dealt with this matter. The raw material of the National Army contrasts so unfavorably with the finished product in physical condition, in personal appearance, and in civic virtue that one cannot believe that the system that produces this change, a system which can be military without being militaristic, will be allowed to go into the discard once the immediate urgency of its present need no longer presses on this people.

A LAUDABLE INITIATIVE.

The University of Illinois is to be congratulated upon the admirable way in which its chemical department has come to the help of scientific workers threatened with starvation of fine chemicals.

What has been done is described in *Science* for March 8, by Dr. Roger Adams.

It is a matter of common knowledge that, before the war, this country was largely dependent on Germany for its supply of organic chemicals and almost wholly so for the finer products. For a time the stocks held at the outbreak of war by importing houses and by the university laboratories kept the wolf from the door. But gradually these approached exhaustion, and it became a question of relinquishing a great deal of educational and research work or of producing these chemicals in the United States.

For those products the preparation of which could be undertaken with immediate and *recognizable* profit, the task of manufacture was undertaken by domestic commercial houses.

But for the complex substances used in smaller quantities for analytical purposes or in scientific research no provision was made. At no time is it easy to persuade the American or British manufacturer of the desirability of making such products.

"A ton? Yes. But a few kilograms? No." may be said to sum up his attitude towards such a proposition.

At this critical juncture the Organic Chemistry Department of the University of Illinois stepped into the breach. Greatly to its credit, from the most modest beginnings it has been able to build up a production which bids fair to meet the most urgent demands of analysts and research chemists. Of the substances manufactured some are rare and complex, such as dimethyl glyoxime (used in the estimation of nickel), and others are simpler and better known products prepared of a specially high purity.

The initiative of the Illinois University has inspired the appointment, by the President of the American Chemical Society, of a committee of organic chemists to study the best means for co-operation in this matter among the scientific laboratories of the country.

HUMOR OR POLITICAL HYPERMETROPIA?

Geology is not a subject usually associated with humor. For this reason I am in doubt how to take some remarks of Professor Mather's in a recent article published in *Science*.¹

After pointing out that uncertainty exists as to whether the climatic pendulum is still swinging toward a more genial period or whether it is poised for another return sweep which will bury middle latitudes beneath the weight of ice-sheets of a new glacial stage, he goes on to say: "It is unfortunate that no certain selection may be made from these alternatives of the one which is immi-

¹Mather, K. J.: Diminution of the Antarctic Ice Cap and the Amelioration of Climate (*Science*, March 1, 1918).

nent [sic], for the question is one of more than academic interest. Legislation which is forward-looking, far-reaching plans for racial progress, promotion of economic welfare, all must be radically influenced by the knowledge—if we had it—that in ten thousand years the Barren Lands of the north could support a population of fifty to the square mile, or that in a similar interval the available farm lands of the globe will be reduced to half their present area.”

Is the learned professor poking fun at us, or has he taken preparedness very badly indeed?

ORIGINAL ARTICLES.

I MARY MacLANE—A PSYCHOANALYTIC REVIEW AND APPRECIATION.

By SMITH ELY JELLIFFE, M.D., and LOUISE BRINK, A.B.

"To attempt understanding," writes Wells, in the words of one of his heroes, "that is the work now before all mankind." It is no new attempt, but because it must always have been a subjective attempt, men have defended themselves against a too clear understanding and therefore defeated the aim of this deep heart desire.

It would seem that the truth of self-knowledge guarded itself by its elusiveness and at the same time continually stimulated, through this, its half revelation of itself, the eternal quest which is the activity of the human mind. The earliest intimations of man's history reveal this attempt at understanding obscured by false and misleading interpretations, whose later inheritance is still the false rationalization and hypocritical explanation which continue to conceal real knowledge from the inquiring mind.

It is indeed true that the inner life of the psyche, big with aspiration, uncertain in its conflict of desire, has been too great to be grasped in anything short of an age-long caution of approach, and perhaps too frightful in its full reality to be grasped without ages of experience whereby gradually to enter into a better adjustment and application of it to the practical business of living.

These ages are by no means completed. A transition stage in their cycle has, however, been entered upon. Investigation has busied itself and occupied itself, probably defensively, with external things, but in the very scientific method with which it has worked and in its true scientific spirit it has been roused also to a new attempt at understanding the things within. It has turned with a demand which will brook no denial to a science of the inner life, and investigation of these inner elements, which after all make up man's nature. For in them lie the forces which give to all the external world its only value and inform whatever is of account in the history of life, in the process of creative evolution.

The means by which man at the present time approaches such understanding vary with the moving impulse within many lives. They are also tentative, timid, hide themselves more or less behind a variety of defenses, advance again with varying degrees of bold-

ness, following thus the same methods man has always made use of, but gaining, as understanding is approached step by step, some clearer insight than has been won before. These revelations, though only partial, impart new courage, and acquaintance with elements hitherto carefully buried in the unconscious depths of the soul, and incite to a clearness of recognition and daringness of admission of factors concealed there. These are they the race has been trying desperately to deny and from the unseen power of which it has been blindly and ignorantly suffering.

Occasionally there comes forward some soul with a bravery that attempts such a fearless self investigation with an intuitive ability to reach into these hidden factors and find them as an integral part of itself, and therefore doubtless of the race of which this individual is only one small part. At least some answering chord is touched by others through an artistic expression of these discoveries, and certain bonds of sympathy are awakened to life, perhaps only into the negative form of resistance, but all of which attest the universal truth of these discoveries. The artistic product, the expression of the self revelations, as well as the character and content of the revelations themselves must, as only a step in this phase of human history, be imperfect, obscured, distorted, misinterpreted in the eyes of the investigator himself, by the welter of impulses within the unconscious sources of life, by the conflict as these seek to realize themselves, none of them clearly knowing its way. For the process of life within the individual, as in the greater creation to which the individual belongs, ceases not in its efforts, its movement always forward though often digressive, while the investigation proceeds. Nevertheless every such true and honest peering into the self, whether it is consciously directed to the universal advancement of this self-knowledge, or whether certain elements have tended to obscure to itself its egoistic, narcissistic character, even to the point of an extreme pathological condition, is of inestimable value in this study upon which the bravest scientific souls have entered.

There is one Mary MacLane in Butte, Montana, who, out of the wide silences of that immense country, and the distracting discords of a careless money-getting city, only typical of the world at large which scarcely dares to look within, has herself been unconventionally unafraid to speak of some elements found there, which are perhaps more universal than even she admits. They rouse her sometimes to helpless indignation with herself, they excite her whimsical ridicule or tolerance, they bore her, they stimulate her; they sometimes blur her vision to their own real meaning and interpretation and prevent perhaps her attainment of a fully healthy, happy conversion of themselves into some joyous active participation in the social sublimation of just these things. For this

is the justification of the human psyche to civilization for continuing to harbor such primeval and self-seeking impulses and instincts.

"*I Mary MacLane, A Diary of Human Days*" (Frederick A. Stokes Company, New York), is a humanly revealing chapter of a life, which had more vividly expressed itself in "*The Story of Mary MacLane*" some twelve years ago, which lived itself out in changing fashion at various epochs of childhood and young womanhood and has come back to a retrospect of itself, sincere and frank and unafraid. It even dares to display a self-absorbed egoism far beyond the limits which the false conventionalites regard as permissible. There are flaws to be picked in Mary MacLane and weaknesses to be found in the manner of the telling of this story of hers. Indeed, she might say that is just what she sets out to reveal as she writes. There are many indications of her insufficiencies in realizing her own life and turning it to such account that many of her perplexities would solve themselves because they would be resolved into a centering purpose. There would then be left no room for many of the difficulties, much of the loneliness of unfilled days.

Life has cast her at this time into the "outward role of a family daughter with no responsibilities," and in this inactivity and insincerity of family circle conversations, marked by reserve with which constant companions securely hide their true selves from one another, she has undertaken this task of writing to help her to keep herself sweet and sane. In the intimacy of her writing alone at her desk she gives free play to the multiplicity of elements which make up the real self, the intensely human self, which proves itself by its distractions and intricacies of manifestation, its seeming contradictions, its libertine longings, to which no outward convention so readily sets the barrier as does the real yearning impulse deeper and truer than these. Such longings are only partial and tentative, merely would-be excursions of the effort of the deeper, surer impulse, which both impels and restrains them. By these it proclaims itself of the unconscious soul of man, which has built itself out of uncountable ages of actual essay of these partial impulses, these "polymorphous" trends, through which the unity of the psyche has been trying to find and establish itself. They have become unconscious because one by one as the race progressed, or as the child, repeating the history of the race, made its way into the culture established about it, these partial instincts found themselves either left behind as no longer serviceable in the growth of culture and the building up of society, or became resolved by a sublimation into some higher and more complete form of self and racial expression and power. This they had preceded and for this they had been a partial preparation.

Mary MacLane is a good deal of a narcissistic self-worshiper,

as she dwells with repeated satisfaction and pleasure upon the details of her physical personality, and on the manifestations of it in the details of dress, manner of life which fills her day, her tastes, the self-appeal in the colors that flash and glow about her horizon, the fabrics that touch her or merely float as "gray, filmy threads" about her inner spirit. Her book runs riot with love of her own body, its wrappings and settings; indeed it is in itself a marvelous narcissistic image reflected again and again in the pool of her own fond and yet analyzing conceit of herself. Yet it saves itself by this truth, that in it she has been clever and discerning enough and clearly honest enough to take this human trait, and though it exists so strongly within her, yet to bring it freely and savingly to the fore. Far more than this she has taken those other many elements which, if the staid and proper world of hypocrisy and self-deceit but knew it, lie beneath and govern human life. With a Freudian intuition, she lays bare in artistic fashion those polymorphous perversities which in the child are incipiently active and in the adult at the most but slumber lightly beneath the exterior surface of decorum.

Her touch might be light and fanciful and so deceive the unwary or those to whom such revelations of universal human nature come unrecognized and unacceptable. They would accuse her of flippancy or of a clever turn of phrase with which she either amused herself or hacked at the conventionalities and some of the so-called sacred relationships of life. Our own repressions and manner of self defense against unwelcome knowledge of the true inner nature would prevent insight into the mass of truth which she has scattered throughout the pages. Her language is often of an almost archaic simplicity of expression, with her free coinage of terms or forms of expression and a characteristically primitive means of gaining emphasis by repetition, the "Green-Green Grass," and the "Yellow-Yellow Butterfly" and other such word pictures. Style and substance are perhaps both infantile, yet the wealth of symbolism of delicate touching of these rioting instincts rising from the unconscious, or seeking there for some power by which they may break forth to dominate her life, these bring a truth in her message which forwards the attempt to understand, which "is the work now before all mankind."

Mary MacLane dwells close to the child in us that grants great freedom to his libido in the erotic enjoyment of skin sensation. All this self of which she writes lies "just beneath the skin."

This "is the Self one keeps for oneself alone. It is the Essence of soul and bones. It is the slyest, subtlest thing in human scope. It is the loneliest: tragically lonely. It is a long, long isolation—beautiful, terrifying, barbarous, shameful, trivial to points of madness, ever-present, infinitely intriguing to oneself, passionately hid-

den: hidden forever and forever." How like this is to the bondage to the unconscious impulse, the autoerotic impulse alive in the unconscious in all its infantile strength, and manifesting itself consciously in many a distressing compulsion, unconquerable masturbatory impulse, impulsion to touch contacts or morbid aversion and avoidance of such set up in self-defense, or pathological affections of skin, likewise the result of the ambivalent desire for skin exhibitionism and contact pleasure and over correction of the same! (Rank: *Die Nacktheit in Sage und Dichtung*, *Imago*, II, Nos. 3 and 4.)

Mary clothes her skin in silken garments and dainty underlinens. "I marvel over it (my sex) and clothe it silkenly." Pink-and-pearl is the dawn in the room of the dream which she has of sexual enjoyment, where she sits on her bed "silk-gowned and ruffle-haired." On the day that she is clothed all in silk, each garment is enumerated with its silken designation. Her fingers are "silken at the tips," the clouds are of silk above her. Besides "I never see," she says, "a soft new yeast-cake without wishing to squeeze it for the salubrious feeling of the tinfoil bursting facilely and the yeast oozing with its odd, dry juiciness through my fingers." It is cold cream, however, in which she revels. It receives grateful mention for its service to her sun-beaten skin, but it merits from her almost a rhapsody as it appears in the "Back of a magazine" "fit for skins of goddesses, fit for elves to feed on—a soft, satiny-scented, snow-white elysium of wax and vaseline and almond paste . . . till it feels pleasantly ecstatic just to be living in the same world with bewitching vases of Cold Cream." Thus her riotous skin phantasy repeats itself in creams and silken textures and kindred tactile delicacies and delights, the supple smoothness of the skin insinuates itself into the smoothness of out-of-door world and of smooth sounding words. It conceives Lot's wife, the lovely and unwilling Lot's wife whom she pictures, as she polishes her nails, as becoming in her defiant disobedience "a beautiful statue, all in glistening salt."

There is here an entrance into another of the strong tendencies which constitute the affective life of the psyche. There is an easy transition from this narcissistic skin worship, expressive of and symbolic of the worship and delight of the "Self Just Beneath the Skin," to the next stage in the psychic development, the psychosexual development as the consideration of our whole nature compels one to call it. This stage is that of homosexual attraction and pleasure. This is a factor in development, an element of character which is founded in the bisexuality of every human being and which serves the manifold and important purposes of a complex society where men with men and women with women have much to accomplish in common, similarity and sympathy of interests and tastes, the inspirations and support of true friendship for indi-

vidual and social interest and advance. It serves likewise in the earlier years of childhood and adolescence to postpone the heterosexual development in the interests of education and culture and in later life to relieve in the same way a certain amount of the otherwise greater intensity of heterosexual interest and activity. So subtly, however, does this psychic element work that it, too, may become exaggerated in its place in desire and flourish at the expense of other interests, of the final sexual aim itself, and may thus become also a menace and a morbidity of soul.

Mary recognizes this element in all women without perhaps clearly understanding its biological origin and its social usefulness. She knows that it has more than the significance of a mere external relationship of friendship, a generally accepted point of view which is responsible for much of the subtle harm which these women and girl friendships work in the psychical life. She admits the inner sexual character of this attraction among women, thus merely bearing again an intuitive testimony to the Freudian contention that sex in the generic sense pervades all manifestations of life and of love, that at base it is all one and but differently expressed and adjusted to meet the different racial and social functions demanded of opposite sexes or of the same sex. She has tasted the blighting effect of an unrecognized character of such friendships when they lured her younger lonely life too strongly, when she "bestowed too much of herself on them in the headlong newness of knowing and owning friendship after her long young loneliness." Now "there is no vice in my Lesbian vein," but she understands now both the true value of the friends with whom she has been and she understands "the deep-dyed Lesbian woman . . . whose sensibilities are overbalanced: whose imagination moves on mad low-flying wings: whose brain is good: whose predilections are warped: who lives always in unrest: whose inner walls are streaked with garish heathen pigments: whose copious love-instincts are an odd mixture of mirth, malice and luxure." And what psychiatrist does not know them, too, and will not be helped to an understanding of them by such a sympathetic exposition from one who has touched them from the inner side, as almost one of themselves? For she recognizes the unconscious dormant possibility in herself as in every woman.

"I long to do a Murder . . . I have a furious, positive Murder in me . . . it would be a simpler and finer thing to do any Murder than to feel, even once, the strangling damnedness rising, rising at my throat." Mary MacLane does no murder. Instead her heart is yearning and tender. The Drab-eyed children who toil haunt her waking hours at night. The shouts of the school children let out to play is ringing human music to her. Her thoughts of those from whom she is aloof are understanding and tolerant. She is

"above malice and retaliation." Therefore she rebels that the murderous impulse must enter and beat within her. Again it is her courage that dares to recognize and name the "universal criminal" which lies in each breast. Though she rebels at its power to torture her, she is not shocked that she discovers it there. She has a courage for bearding the lions of the unconscious which far surpasses the pseudo-righteousness of this world. There can be no room within her, if she keeps clear this light of understanding, for that attitude of judgment and condemnation by which individual and society wreak vengeance upon the criminal in order unwittingly to stifle and silence their own unconscious impulse, which recognizes themselves, intuitively but not intellectually and rationally, in the criminal before them and therefore pursues him the more unmercifully.

There is another tendency which wanders still more broadly through society, beneath the surface of consciousness, a troubled ghost out of a long past, which cannot be laid and which in the lives of most women, as in that of Mary, can never come to a direct satisfaction. Such satisfaction no longer belongs to usefulness to society and must therefore be denied, but finds itself difficult of sublimation at all times into a higher form of service on a higher plane. This is the prostitution complex. Inherited as it is from a differently organized society where for long centuries it was exercised and fostered by use, strongly entrenched within the unconscious, it too is the source of much of the unrest and dissatisfaction whereby many women miss the best of life and fail in really giving their love and finding it again in the giving. Yet it is so unacceptable to conscious recognition that it is too often denied and is again projected with scorn and contumely upon a few more obvious victims of its power. And the unrest and destructiveness of its harborage unseen and unknown in many a life goes on to work unhappiness, mental distress and acute mental illness.

More wholesome is a recognition and admission of its presence such as our author frankly reveals. For after all its inheritance is a legitimate one from the ages of human history, and present culture will be able to offer a much more satisfactory discharge of this impulse through its higher channels if the fear of it is removed through a calm understanding of it. It is only necessary to examine the dreams of both men and women, whether neurotically inclined or wholesomely adjusted to life's problems, to discover how universal is the tendency to a free and promiscuous sex life, built into the fabric of past psychical history. The added element of dependence and support changes it then for the woman into a more truly prostitute complex, not economic dependence alone, but the peculiar demands of a woman's nature economically

supported and strengthened from the earliest dawn of society. Better, therefore, that some of this unconscious impulse should find a more free outlet through such recognition as Mary MacLane grants it.

It strikes her with no prudish, repressive terror when suddenly in the dusk she realizes that she wants a Lover, just wants a "Lover as the leopard wants hers." It cannot be said how far the many elements which play so freely up to the surface of her psychic life may have diverted her from the road on which a lover might have been found and kept. Her touch of Lesbian fire, the suffusal of sensation in her longing "that crept into my bone-and-flesh from forehead to heel," while even the mist of dark cream hangs above her, all suggest the too strong attraction of these lesser phases of life, more infantile pleasure goals, which have held her from either goal, the goal of heterosexual love and the active finding of herself in the work of the world which should have been hers.

Yet it is the fearless admission of the love sense, its pure and rightful awakening, that enable her to receive it, thrill with it as her right, but use it to call no Lover to her in its sudden madness. The dream in the pink-and-pearl dawn in the married bedroom, when another than the husband had been crudely admitted, brings no neurotic revulsion and panic of fear, for this lawlessly expansive impulse of the unconscious is so simply acceptable to Mary in its inherent right that it provides her with none of those defensive terrors which create much of the illness of those who do not dare see and understand. This wild sex desire flares up through her rioting appreciation of colors: her phantasy has found it living itself out in the previous incarnations of which her soul comes and tells her; it breaks forth easily and unexpectedly in her figures of speech, as when to despoil a little charlotte-russe with a fork grants her "the same feeling of lawless, sweet-fiery lust which must belong to a Moslem soldier when deflowering a Christian virgin: and harms nobody."

Mary MacLane's reticence concerning her family is not that of a heartless indifference. Once a note of perplexed pain sounds in the half expressed question why "no human family tie holds and warms" her. We hear that her childhood was a stubborn one, without an object to love and wonder why this being so early missed a course of love upon which to build better. The formula of a reactionary attitude of later indifference and coldness, a starving of one's soul for love because the earliest childhood love has been too intensely directed toward someone, the parent of the opposite sex, has been found to hold true in so many a life which has later failed to find itself, that it may be looked for here also. She feels it a "lostness in one when the mother who bore her got from it at best but a small, cool dislike." As for the father there is no mention

of him as such, but there is a longing for the personality of a God. Like a child she cries repeatedly for God to visit her. "If He would only come and tell me one thing, it would be enough. It would show me a direction and I could keep on it by myself . . . I am strangely weak . . . and to know one eternal certain thing would be so roundly restful, I could then go on." She goes on to imagine such a visit of God, in the person of a modern groomed man, who, however, leaves her after all to her own certainties or uncertainties of "all the little frightful puzzles which thrive all around me." "God, to be God to me, must know all those things." Such the child's demand and expectation from the father, but she knows also with the reality of the "wide daylight" of her life that after all he will not tell her these things, but leave her to her own finding out. Thus can be seen the early child perplexity and wonder, too big for parental understanding and satisfaction, and turning away thus upon itself with the unanswered craving which is still seeking satisfaction from God, and finding it neither in the parent nor there. It is the call of the child soul that shrinks from reality which it must face, to the more secure and easily satisfying rest upon a father image, which can only prove unavailable in the face of real problems, to a soul as frank with reality as hers.

She is thrown back, therefore, she admits, to love herself more and more. "It is good, since I can't find God, since I can't find way-of-truth however I grope about." Unconsciously, too, she seeks to thrust herself still further back into security with the mother, to whom now consciously there is only cool dislike. Her conception of the perfect rest of death is couched in terms of an intrauterine phantasy, when even the depth of the coffin in the ground is measured in the mystic number of nine.

God, seems, as expressed in her letter to Him, to recede from her life, so far that she has to beg attention from Him and not get it. She admires Him because He is so strong though so far off. Yet it is He who has given her all the exquisite beauty in which she bathes her soul and body. She has Him to thank for that. And He surpassed even this when he made "the regal wistful glory of John Keats." Him she seems to have taken to herself as the lasting image of this child longing for the ideal father, whom she cannot reach, and finds in his poetry and the thought of his life, the crystallization of the beauty she worships and the human form, perfected and idealized in the dead poet, at whose shrine she kneels.

The terror side of the father image she must escape, the unconscious fixation to the father ideal, which projects itself in the fears, aversions and dreads familiar to the psychopathologist, finds curious expression in the phantasies which built up a human figure to precede the glistening salty image of Lot's wife. Lot's wife prefers disobedience and the transformation to the salty pillar to

safety with Lot in his refuge. Her escape would lie not in freedom with him, but rather in fleeing from him though through her own death. This Lot's wife, Bella Lot, Mary has named her, is a young, exuberant creature, bound by marriage to the venerable patriarch, probably "eight or nine hundred years old, after the surprising long-lived fashion of the period," and it might be added after the surprisingly ageless persistence of the father image in the unconscious, fettering and hindering the freedom of the youthful psyche. The glistening pillar of salt, so useless and destructive an escape from the bondage, is typical of the narcissistic fixation which has been noted in Mary MacLane's adoration of her own body and its glowing delights upon and "Just Beneath the Skin." Mary's sapphic admiration of Lot's wife is, too, a hint of that so closely connected other phase of psychic development which is but a little way out from the bondage of these same earlier fixations. The child thus bound to the father only partially finds the healthful way of development. Bound by the earlier fixation, it oftentimes realizes at most but that stage of psychosexual evolution in which it finds again in itself the object of love, and satisfies in its own person, and one step further in an object of its own sex, the love impulse which the incest taboo has forbidden in its first desired form in the father. Like Lot's wife, to a certain extent, Mary may have escaped from the first loneliness which followed the first unconscious denial of the father wish by a fanciful destructive transformation into a beautiful narcissistic image expressive not only of adoration of itself but of worship of its own kind, its own sex.

This finds further confirmation in the chapter devoted to the eating of the cold potato, which is suggestively named "God compensates me." Her delight, an almost ghoulish enjoyment of it, of a cold boiled potato comes at midnight, when all other pleasures are laid aside. She must be very hungry and then "at midnight, it is all unexpected magnetism." "It's a satanic delight I take in it. It's a sly private orgie I make of it: a pirate's banquet, a thieves' picnic, a pagan rite, a heathen revelry, a conceit all and unhal- lowedly my own." It must be eaten with a little glass salt-shaker in one hand and it is a sweet, dark pink Cold Boiled Potato upon which the salt is eaten. "And I sprinkle it with salt and I nibble, nibble, nibble." Among other things "it tastes of rainwater and of salt and of roses." Are we not here in the archaic realm of a phallic phantasy? God compensates her for the father denial in as highly a symbolic fashion as that in which primitive man expresses his reproductive phantasies through salted food, fertilizing rain and phallic forms. Here alone at midnight she finds compensation for her loneliness and unconscious denial in a sadistic enjoyment, which, in perfect symbol, overcomes and revenges itself upon

the denied father by castrating him through the potato and devouring it in unconscious childish and primitive identification of food and impregnation phantasy.

With the avenues of her unconscious so freely open to display, it is not strange that other infantile phantasies present themselves. She grows "shakily mad" in a violent reaction to the smell of turpentine, reminiscent perhaps to her unconscious of the earlier fascination of evil penetrating odors with customs and interests which fall early and deeply under the repression of later culture. She offsets this, too, through her intense love and feeling of beauty. It both manifests itself and hides itself in the abundance of color with which the book glows, or the gray and black shades which at times dull her. They express her moods, her desires: they oppress her, they thrill her. They are a large part of her language of symbolic revelation of herself. Her unconscious has sprung flashingly into the light of common day. She is not afraid of it but welcomes it and keeps it untrammelled that she may avoid thus its bitter domination of her into paths she would not follow, and that she may preserve even in her loneliness a saneness of understanding. She does not fully understand the unconscious with which she thus deals in its flashings forth. Yet she has more acquaintance with it than most of the world allows itself. Therefore her book in its freedom gleams with many a light into those depths. She has some idea of the chaos there if one should be completely submerged within it. She would like to go mad, into the "beneficent bedlam" where "a Door is not a Door, probably; a Cat is not a Cat, belike: and Tomorrow is not Tomorrow at all." In reality she saves herself and may save more from such utter defeat if others will learn to accept such revelations of the true human psyche as these fleeting pictures afford. They are a part of the attempt to understand, part therefore of "the work now before all mankind."

THE TREATMENT OF CARCINOMA OF THE BREAST BY THE ROENTGEN RAYS.

By RUSSELL H. BOGGS, M.D.,

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Treatment of carcinoma of the breast by the roentgen rays has been carried out by many during the past fifteen or sixteen years, and is today a recognized method in the treatment of post-operative cases, recurrent and metastatic, primary inoperable and primary cases which do not permit operation. For a long time it was taught and accepted as indisputable that the only proper and scientific method was the radical operation, which meant the surgical extirpation of the growth even in the hopeless stages; but today it must be recognized that surgery, taught so long as the only method, is really only part of the treatment. Though operation still holds first place in the early cases, even at this stage it should be supplemented by roentgentherapy. This sentiment is spreading among some of the leading surgeons, who in the past did the most radical operations for cancer of the breast at any stage, their advanced views springing mainly from comprehensive experience with a great number of cases traced carefully to their end results. Roentgentherapy is taking the place of the ultra-radical operation, such as removal of the supraclavicular glands, or the clavicle.

It is our duty as roentgenologists to teach the profession the indications for roentgentherapy, and that postoperative treatment is just as important as asepsis before and during the operation. While statistics are of little value, it can be safely stated that proper post-roentgen treatment will prevent from 25 to 50 percent of recurrences even in the early cases, because cancer cells can be destroyed at a greater depth and distance from the original growth. If the surgeons can cure 40 percent of cases in a certain class, why not make it 90 percent or more? It will be a big task to demonstrate this fact to surgeons, inasmuch as many of their cases will receive inefficient therapy in the hospital by a non-medical technician, and if results are not obtained, they will relieve themselves of the responsibility by saying the rays were at fault. Then, too, it is feared that too much therapeutic work is undertaken in a halfhearted manner, even by many who can do exceptionally good roentgenographic work. Surgeons long ago agreed that too many unqualified physicians operate. Since they know that proficiency

is necessary in operation, they should realize that just as much care and skill is required in giving therapy.

Treatment of carcinoma of the breast by the roentgen rays has, comparatively speaking, passed through the same stages as surgery. The early stage might be compared with surgical treatment of a quarter of a century ago when they only amputated the breast. Our technic in the beginning was very crude; we neither used filters nor had a standard dose, and we omitted important chains of lymphatics where metastases frequently occurred. Indeed, it is quite remarkable that a creditable number of good results were obtained when one considers the inefficient equipment and faulty technic employed.

Today many have standardized their dosage and, with the Coolidge tube, are able to give uniform treatment, but the amount of radiation which should be given has not been determined in a uniform manner by the roentgenologists. This is, of course, a difficult task, each case being an individual study; nevertheless, it is time more attention be given to the postoperative treatment of carcinoma of the breast, in order to standardize, as far as possible, a technic for the different types and stages of the disease, just as surgeons have standardized operation.

Take a given case; let us decide what amount of radiation should be given immediately after the operation, how extensive it should be, when and how often it should be repeated. All roentgenologists agree that each case should have a full physiological dose, or all that the skin will stand, not only to the anterior chest wall, but to every chain of lymphatics draining the breast, as well as to the opposite side of the body. The location and stage of the tumor, the kind of operation performed, and the physical condition of the patient, must be considered carefully in determining treatment. The writer believes two to three times the usual dose of radiation can be safely given in the supraclavicular region, in places where there is no scar and where the cutaneous circulation has not been interfered with by the operation. A study of the supply of the lymphatics and the manner in which they metastasize should be made by every one treating carcinoma of the breast. This will never be done by the non-medical technician. In fact, too little attention everywhere has been given to the supply of the lymphatics, their depth and extent, and the best manner of thoroughly radiating each chain. Raying the lymphatics sufficiently to proper depth and coextensive with metastases is indeed no easy task. It requires as much care and judgment as the most careful dissection. Efficient radiation makes operation more radical, increases the percentage of cures in early as well as in more advanced cases, and delays recurrence in all cases.

A visit to our best hospitals shows that a very small percentage

of carcinomas operated upon receive proper roentgen treatment. Who is at fault? Both the surgeons and the roentgenologists. Many surgeons refer for postradiation only cases which are really considered inoperable and then often not until a recurrence has taken place. Still they would like to make the operation more radical. Do they not know that this can be accomplished by the roentgen rays? Many cases have received treatment as a placebo, rather than in a real effort to effect a cure. Often these patients would be given a few treatments within a week or ten days after the operation with no further radiation. This was called postradiation, and from this slipshod method the physicans and surgeons drew their conclusions as to the value of the roentgen rays. Had they taken no more pains with the operation, surgery would long ago have been abandoned.

If we as roentgenologists are going to treat cancer of the breast, we must be familiar with the different forms and stages, so that our opinion will be worth something in deciding the best method or methods of treatment. We should know whether or not operation is indicated, as well as what can be accomplished with the roentgen rays. We must be consultants, rather than merely technicians as some have been in the past.

It has been pointed out by competent surgeons, when an operation was performed before a diagnosis could be made clinically without a microscope, that 80 percent of the cases could be cured. Deaver and McFarland, in their recent book, "The Breast, Its Anomalies, Its Diseases, and Their Treatment," make the following statement:

"It has been stated that 80 percent of patients in whom the disease is confined to the breast, as proved by both macroscopic and microscopic examinations of the tissues adjacent to this organ are permanently cured of their disease by the radical operation. Therefore, a patient presenting a small movable mass localized to the breast, can be assured that four out of five cases of a similar nature are cured by operation. When axillary lymph nodes are palpably enlarged as the result of metastases, the chances of operative cure are at once diminished to one in five." The authors further say that "In the opinion of many surgeons, involvement of the supraclavicular glands is a contraindication against operation.

The absence of palpable enlargement does not always mean an absence of carcinomatous involvement. Halsted found that, notwithstanding the present-day extensive operation, death from metastases occurs in 32.4 percent of cases, and even in cases with microscopically negative axillae. A few years ago scarcely any of the physicians or surgeons realized the importance of this; and even today there are some who are operating on late or advanced cases expecting the same results that the leading authorities obtained in early cases. Retraction of the nipple, axillary and supraclavicu-

lar involvement are late symptoms from a prognostic standpoint. Physicians who talk about favorable cases for operation when the nipple is retracted, as well as when the axillary and supraclavicular involvement is present, should read Deaver's book quoted above; in fact anyone treating cancer of the breast, who reads this book carefully, would not be so radical from a surgical standpoint, and would appreciate more the value of the roentgen rays.

Deaver questions whether as much palliation is received from operative as from nonoperative methods, and expresses his general dissatisfaction with operations of a palliative nature in the treatment of carcinoma of the breast; since, in certain cases the disease has been excited to greater activity by an incomplete operation, and the life of the patient considerably shortened. In this connection he mentions the unreserved statement of Bloodgood, that " * * * incomplete operation hastens death." He further states that since 1897 such extraordinary advances have been made in roentgentherapy that remove most of the indications for the ultraradical operative procedures, which have practically no curative value, and a primary mortality of at least 25 percent. Since Deaver's carefully prepared volume is a resume of the entire medical literature and of world wide clinics, and since he has included a valuable chapter of roentgentherapy of Pfahler's, it deserves more than passing notice.

For the writer's part, he is well convinced, from the cases he has seen during the past 15 or 16 years, that an incomplete operation should never be performed, not even for palliation. It is just as necessary that as complete a study of lymphatics of the breast, the frequency and extent of their metastases should be made by the roentgenologist as by the surgeon. The lymphatic supply of the breast is greater than that of almost any organ of the body, so that metastases even of the abdominal organs occur more frequently than is generally realized. In the past many have given a few treatments over the line of incision, axilla, and supraclavicular areas. Such treatment is very incomplete, since it omits those lymphatics which frequently metastasize; namely, suprascapular, anterior pectoral of the opposite side, internal mammary, subscapular, para-vertebral, xiphoid, and inguinal group. A study of bone metastases makes us realize how extensively the lymphatics become involved. It is known that metastases may occur in distant glands at a very early stage of the disease. While the axillary glands are the most frequently involved (indeed so frequently involved that microscopic freedom at the time of operation is exceptional) in some cases they are free when there is involvement of the abdominal or other internal viscera. The value of palpable glands is overestimated. The lymphatics in the axilla may become enlarged by previous infections of the arm or breast. Therefore

it requires judgment, and in some cases microscopic examinations, before the cause of enlargement can be positively determined. Metastasis, too, varies with the different types of tumor and occurs earlier in the young and fat patients, owing to the greater richness of the lymphatic supply. Efficient roentgen treatment must take care of these variations.

It is generally conceded that the smaller the caliber of the lymphatics, as well as the greater the degree of senile atrophy, the greater the tendency to oppose cancer dissemination. If the roentgen rays did nothing more to adjacent lymphatics than produce a sclerosis, the treatment would still be indicated for retarding the disease. The frequent involvement of one breast to the other, is due to the distribution of the lymphatics of the chest wall. Autopsy has shown that the liver metastasizes more frequently than any of the internal organs and in many cases becomes involved in comparatively early stages.

According to Handley, the frequent involvement of the liver is attributed to the cancerous dissemination along the deep lymphatics of the fascia of the thoracic wall to the epigastrium and to the umbilicus, whence these cells follow the subserous lymphatics to become deposited either on the surface of the liver or are conveyed along the lymphatics of the falciform ligament to the portal glands. If Handley's deductions are correct, we should never omit heavy treatment over the epigastric region. The next in frequency are the lungs and pleura, which are supposed to become involved through the intercostal or supraclavicular lymphatics. A study of autopsies shows that almost any organ of the body may metastasize from cancer of the breast, and however much confined to the superficial tissues this dissemination may seem to be, no one can absolutely foretell how far the so-called "microscopic growing edge" of cancer may extend. Bone metastasis increases with the proximity of the primary growth, the clavicle and distal extremities rarely being involved.

Many consider a three-year limit a cure of cancer of the breast, but we cannot be sure recurrence will not take place later. Barker has stated that 30 percent of the cases that are clinically cured at the end of three years, later die of cancer of the breast. Since operation has about reached its limit and since ultra-radical operations are not practical until some better form of treatment is discovered, the splendid results achieved from radiation furnish more than sufficient reasons for giving every case of carcinoma of the breast postroentgen treatment. This should be done even if the tumor is only as large as a filbert, because even in such cases there may be early and fatal metastases. Handley says the pelvic viscera are involved in 8.6 percent of the early cases in young patients, and in only 4.8 percent of the late cases of older patients.

While roentgen rays find their most useful field in postoperative therapy, it is difficult to convince either the patient or the average physician or surgeon of this fact, because they cannot see that anything has been accomplished. It is the teachers of surgery first of all whom we must convince, because today they have come to realize that the most radical operation, even in the early cases, does not always reach the cancer growing edge.

Many roentgenologists have adopted the following, or its equivalent as a standard dose, or the amount which each area of the skin will tolerate safely, using a Coolidge tube and a modern transformer, tube distance 8 inches, filtering the rays with 4 millimeters of aluminum with a 9-inch parallel spark gap, 25 milliamperes minutes are given. With most transformers this dose will measure 20X Koenig-Gauss modified Kienbock scale. Most of us would like to give more radical treatment in order to produce better end results, and everyone has been looking for some means by which the skin will tolerate larger doses safely. The writer does give larger doses than this over the supraclavicular area as soon as possible, because this is a place often involved, and the surgeon seldom advises opening this chain, because when involved many have learned it is really inoperable.

Unless the roentgenologist has witnessed the operation he should always obtain a careful report from the surgeon as to the location of the growth in the breast, as well as the extent of the disease and type of tumor. Then the amount of treatment, as well as the most important regions to treat can be determined. We all know that not only the axilla and opposite side but also the glands in the pelvis should receive postradiation if the best results are to be obtained, but this is not always practical; first, because the patients will not consent to such a lengthy course of treatment, and secondly, because the number of square inches that can be radiated is limited when a full dose is given more than once. None are able to tell in the individual cases what chain or chains of lymphatics have metastasized. If the growth is small and situated to the inner edge of the breast, it would probably be more important to ray the opposite breast, opposite axillary, supraclavicular and suprascapular areas, then the axilla of the affected side, on account of the location of the lymphatics which drain the sternal side of the breast. The inner side is rarely involved as compared with the axillary. All ray both the axilla, supraclavicular and suprascapular areas, as well as the anterior chest wall, and many ray the opposite side, but as before stated, since the viscera, particularly the liver, mediastinum, lungs and pleura so frequently metastasize, treatment should be directed to these organs as well. This area is the least that should receive postroentgen therapy, and is never wide or

extensive enough in advanced or recurrent cases. An examination at autopsy of the lymphatics will convince you of this fact.

What we are looking for, therefore, is the best method of raying the widest area with the least effect on the skin, and the least loss of radiant energy. The writer has adopted the following method and the experience gained from treatment of recurrences has made him increase the areas from time to time.

1. In order to prevent recurrence in the wound, and destroy any foci in lymphatics of the anterior chest wall leading up to the inner clavicular area, three to four areas of anterior chest wall receive treatment, the last being directed downwards towards the liver. Then the liver area is given one anteriorly, one laterally and one posteriorly. With this amount of treatment, the scar is nearly all removed and a recurrence in the area is rare in comparison with the number of recurrences in cases not treated by radiation.

2. The axilla receives from three to four doses and is cross-fired as much as possible. One area below the axilla can be covered by one treatment laterally. The supraclavicular glands are usually involved from the axillary.

3. The supraclavicular region is divided into four areas: one directed obliquely inwards including the lower cervical glands, one downward through the shoulder area towards the axilla, one obliquely downwards and backward through the clavicle, and one obliquely forward from the posterior surface.

4. The suprascapular area much more frequently metastasizes than the subscapular. Each should receive a full dose on the affected side while on the opposite side the subscapular area might be omitted in early cases.

5. The mediastinum should receive one or two treatments from the posterior to an area between the spine and scapula of the opposite side directed towards the affected breast region.

6. The opposite side is rayed according to indications and never receives less than from 4 to 98 treatments during the course.

7. The epigastric region must never be omitted, as this is one of the avenues by which the liver and pelvic viscera metastasize.

The interval between the first and second course of treatments is four weeks. However, in most cases the supraclavicular glands are rayed again in two weeks instead of four.

In treating the areas mentioned the rays must be so directed that the deep glands in the axilla, under the clavicle, in the mediastinum, those leading to the liver, and all the viscera which metastasize, will receive a full roentgen dose. This means that cross-firing must be employed, so that the deep glands will be given from 3 to 7 times the amount that is given to any skin area. If we give 20X Koenig-Gauss modified Kienbock scale dose at the surface, in order that the tissues at a depth of 2 inches receive 20X, sufficient ports of

entry must be employed to make up for the amount of intensity of the light which is lost by distance and by absorption by the tissues. If the glands to be rayed are four inches from the skin, more cross-firing or more ports of entry must be used than if the glands are only two inches from the skin. Experiments have shown, if the glands to be treated are below the surface, that the intensity diminishes from 100 to 15; that is, about one-seventh of that at the surface. The writer is certain that the majority of those treating carcinoma of the breast by the roentgen rays employ too few ports of entry and, consequently, the deep tissues receive only a fractional dose. This failure to employ deep therapy is responsible for many recurrences.

For the past five or six years the writer has considered ante-operative roentgen therapy a very important and useful field in early, as well as in advanced carcinoma of the breast, but only comparatively few cases have been referred, as surgeons do not want the operation to be delayed for three or four weeks. It is a demonstrated fact that in lymphatics where the vessels are of a small size, carcinomatous cells do not disseminate nearly so readily as where they are of a larger size. It has been proved that after roentgen therapy the lymphatics undergo a sclerosis, thus reducing the size of both the lymph nodes and vessels, which in turn reduces the danger of metastases. A cancerous mass after being rayed changes in type, becoming more scirrhus and is rendered much less malignant. Carcinomatous tumors in the breast which have been growing very rapidly will be checked and reduced in size within a very short time after full doses of radiation. It has been suggested that some of the patients are rendered "immune" to the growth of carcinoma for some time after such treatment. However, no one can prove at present whether there is really any immunity, or whether the checking of the growth and improvement in the general health of the patient are due entirely to histological changes in the tissues. Observers agree that the type of tumor changes and that the danger of metastases is reduced by such treatment.

Anteoperative treatment will often render a more advanced case operable, and, if deep metastases have not already taken place, more permanent cures can be obtained surgically. As I have before mentioned, metastases will not occur so readily if the caliber of the lymphatic vessels has been reduced by treatment. However, if the liver or any other of the internal viscera have metastasized before the treatment is given, the cure by operation would be only an apparent cure. But the operation would not hasten metastases as it would without ante-operative treatment. Post-operative roentgen treatment cannot take the place of ante-operative treatment as many think. The writer has a few cases apparently well after three to five years, which verifies this fact.

We all know much palliation, and many times a temporary cure can be produced in inoperable and recurrent cases. A study of the lymphatic supply of the breast and the extensive metastases, usually visceral, which have already taken place, explains why the results are often only temporary, or from one to three or more years.

SUGGESTIONS FOR THE DEVELOPMENT OF A PERMANENT MEDICAL AND NURSING CORPS FOR OUR NEW ARMIES.

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THE MEDICAL CORPS.

For an army of two million men about 10,000 competent medical officers will be required in addition to those of the regular and national guard services and the reserves. Of the 130,000 medical men in this country it is estimated that less than 60,000 can be considered even as possibilities.

There is going to be a great shortage of competent medical officers for our new troops with all that is thereby involved. Modern warfare has proven that the salvation of armies, as far as freedom from disabilities due to sickness is concerned, depends on the efficiency of the medical corps. There is a shortage of medical men for military service in the world. During February, 1917, I learned in France that there was a serious shortage of medical men in both France and England, that at least 1,000 more were needed which they could not see their way to supply. Among the first calls on us from the allies has been one for medical assistance. Although 25,000 of the 40,000 medical men in Germany are in military service, the Surgeon General of the German Army stated on February 7, 1917, that he would be obliged to relax the regulations in order to gain about 1,000 young medical officers who would not ordinarily be certified physicians for another year, and, indirectly, the Surgeon General of Austria-Hungary stated that they could use any kind of medical men and needed large numbers.

The solution of our own difficulty promises to be one of the most serious problems before the authorities and as medical officers are made only by training and experience, it is hoped that the new army bill will contain provisions for the immediate foundation and maintenance of a national academy, under the direction of the Surgeon General of the Army, for the education of medical officers from among the undergraduates of our medical schools and other eligible young men. Through extension courses every six months a large number of partially trained men could be turned out and in a few years all of the suitable young medical men of the country should be potential officers. Universal training of medical men, at least, seems imperative.

This would not solve the immediate emergency but some such

step is necessary in the line of future preparedness in this special direction. The courses in medical schools on military hygiene do not fill the need for actual service. Under the direction of a national institution should come all efforts at medical military education.

A RED CROSS NURSING SERVICE.

A volunteer Red Cross Nursing Service in peace and in war through a centralized, organized union of all the forces active in supplementing the medico-military work of the country by gifts of money, time and talent.

Behind the army of the men in khaki stands another patriotic host, the army of our women, without which Red Cross work generally and all of the efforts of the men at home and at the front could not overcome the hardships of war. As a section of the American Red Cross, using its emblem, and with the co-operation of all societies of charitable women and nursing organizations, special committees should undertake to train volunteer nurses in the interest of the wounded and to bring them into harmony with the official army nursing and medical service, through the American National Red Cross, which is the only volunteer society authorized by the Government to render aid to its land and naval forces in time of war.

The employment of our all too few graduate nurses, except as chiefs and head nurses, should be regarded only as a temporary expedient. Communities should not be deprived of their services. Without a definite career ahead of them, most of the young women volunteers will soon be discouraged and will be a disappointment and a failure as nurses' aids under the present plan for Red Cross Base Hospitals, and this plan should also be regarded as temporary.

Twenty-five thousand young women between the ages of 18 and 32 for each million soldiers should be given a two years' course leading to a certificate of graduate Red Cross nurse, carrying with it definite official standing as a Nursing Sister with the right to wear the uniform and the badge of her profession when on duty. This training course carried on in war and in peace should fit them not only for their special military service but also entitle them to credits on the courses required of the graduate registered nurse, should they elect at any time to take such a course.

In addition, undergraduate nurses in the regular schools who can be spared and who desire to serve in war should be released and allowed credits from their Red Cross Service to be applied on their civilian course and vice versa. Instruction can be carried on in the civil hospitals all over the country whenever military or Red Cross Hospitals are not available.

This and other work should really be incorporated under a new

national society to keep patriotic and self-sacrificing women interested and in practice by preparing them during peace for the exigencies of local and national calamities such as war, fire, floods, and epidemics. Active love for humanity can find expression in every conceivable form in the work of these women.

In Germany, since 1866, such an organization has been in existence under the name of the "Vaterländische Frauenverein" (The Fatherland Women's League). Since the outbreak of the war it has grown to enormous proportions; there are now over one million members in about 3,000 branch societies. Two days after the war broke out 4,000 of their nurses volunteered for service and there are now over 62,000 of these young women in service either as graduates or under instruction. The Women's League organization has reached an astonishing degree of perfection. Any woman of good character, independent of rank, wealth or creed, can join and serve on committees.

Active members pay definite dues and do whatever work they seem best qualified to perform and associate members promise to contribute something each year and to promote the general interests of the society. Each local branch is, except for a few general laws from the Army General Staff and from the Red Cross, entirely independent in the administration of its affairs. Every detail of their work as carried on is explained in a series of books, pamphlets and maps, etc., of which the following is an outline:

1. Work in the interest of sick and wounded soldiers. Training of volunteer nurses; convalescent homes; homes for blind and crippled soldiers; collections in the interest of the work.

2. Infant welfare work and the care of the lying in; especial attention being given to the wives and children of soldiers.

3. Child welfare work (Kindergartens, orphan asylums, crippled children's homes, etc.)

4. Vocational training of adolescents; domestic science courses; industrial schools, etc.

5. Social welfare work, including the care of relatives of those at the front.

6. Care of the aged and debilitated.

7. Efforts in behalf of the prevention of epidemics, etc., etc.

8. Miscellaneous work. Mothers' clubs, free educational lectures for the public, collections for the benefit of the needy, charity work in general, free concerts and plays, etc.

At the head of this and of all other volunteer organizations stands a military inspector of general rank, and on the Army General Staff, who coordinates their activities in times of peace so as to be ready at short notice for all emergencies in the event of war. Territorial delegates stationed in various parts of the country assist him in overseeing and planning the relief work. During war the force

of these delegates is increased and for every important medico-military official a civilian of corresponding rank is appointed to represent the interests of the volunteers. Effective, zealous co-operation of these workers moulds into the great system of the official service, all volunteer efforts for the wounded with a minimum of friction and with harmony and success.

In order to coordinate all efforts made and to avoid a scattering of forces so often characteristic of volunteer undertakings, instructions from the Inspector General are sent to his district representatives, who pass them on to the societies. In addition, the material preparation for successful attendance on the wounded is decided on by the military authorities. Definite regulations are issued, for instance, concerning the fitting up and management of convalescent homes, railroad refreshment and emergency booths for soldiers, rules for making patients' bedding, clothing, etc., etc.

THE REHABILITATION OF THE DISABLED SOLDIER.*

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Today plans are maturing and efforts are being redoubled to get the largest number of civilians from the farm and shop into uniform, through the training camps, onto transports, and to the front. Tomorrow after the first battle the human debris that has survived the shock of war will be collected and returned for salvage.

It will require as perfect machinery to convert the greatest number of the mentally and physically disabled soldiers into self-respecting, self-supporting citizens as it does to train and transport them to the firing line.

The retraining of the disabled soldier for the life of a civilian is not only economically and socially desirable—it is a sacred duty, the nation owes to him who has fought to protect it and to maintain its principles of democracy.

In the past the disabled soldier was given the solace of a small pension or admission to a Government home. In either event, he was condemned to a life of idleness and dependence with ample opportunity to reflect upon his unfortunate condition. He was unproductive and often found it difficult to decide how he might exist on his meager stipend.

In modern war the numbers engaged are so large; the expense so great; the sacrifice so nation-wide, that the restoration of the cripple to productivity and to his place in society is a public necessity.

The wounded soldier will come through the field and base hospital, and if found unfit for further military duty, will be returned from overseas to a convalescent hospital in this country. Here, if not earlier, his social and economic rehabilitation should begin. The disabled may be divided into four general groups: 1. The blind. 2. The strictly medical. 3. The psycho-neurotic. 4. The crippled. The blind, the strictly medical, and the mentally deranged may be cared for in existing institutions, but the large number of adult cripples present a new problem for which our ordinary peace agencies are inadequate. Its solution can only be made satisfactorily by the combined efforts of the physician, the orthopedist, the teacher, and the sociologist.

In dealing with the disabled, delay should be avoided for the opportunity of restoring function to maimed limbs and disordered

*Read before the Peoria County Medical Society, February 5, 1918.

minds will to a large extent soon be lost. Failure to meet the problem quickly can only partially be remedied later.

Our discussion will be limited entirely to the rehabilitation of the maimed soldier, which is a three-fold problem, involving: First, the attainment of the highest degree of physical reconstruction; second, the reeducation or the instruction given to prepare the disabled for the occupation for which his ability and social condition best suits him; third, the finding of his suitable employment.

The crippled soldiers have usually suffered one of the following general types of injury: 1. Amputation of one or more limbs. 2. Bone injuries. 3. Lesions of and about the joints. 4. Nerve injuries.

These groups require various types of treatment and somewhat different reeducation. In brief, they will need the services of the physician, the orthopedist, the physiotherapist, the social worker, the vocational teacher, the limb manufacturer, and the placement expert. They will want the active sympathy of employers and the representatives of labor.

MEDICAL.

As a result of his harrowing experiences, the average wounded soldier is a patient both of lowered resistance and mental depression. A tedious convalescence, often after long suppuration of his wounds, and the enforced idleness of the hospital, tend to destroy his spirit of initiative. He has to be built up mentally, physically, and morally. To do this, it will not only require careful medical treatment, but he must have instilled into him the hope and conviction of his ability to again take part in the activities of his community.

ORTHOPEDICS.

In dealing with the crippled, the ingenuity of the orthopedic surgeon is taxed to the utmost. He will meet many severe cases that require prolonged care and patient treatment.

If amputation has occurred, the stump must be hardened by use, and a constant size must be reached before an artificial limb can properly be fitted. To make the best use of the limb, the joint above the amputation must be treated with massage and exercise until its normal range of motion is obtained. If the flesh is adherent to the bone, or if a large scar exists it has to be treated by massage and operation so that a suitable bearing surface is provided for the artificial member. The French authorities do not fit a prosthesis until a photograph is made of the stump, its dimensions determined, the state of the scar recorded, a radiograph made to exclude exostoses that might interfere with the use of the limb, and a cast of the stump is made from which the artificial limb is built.

A prosthesis should not be fitted to a stump for from two to five months after the last operation. It is advisable for a person expecting to wear an artificial limb to use a provisional one in order to harden the stump and to reduce it to final form before a permanent member is fitted. The limb provided should compensate for the physiological rather than the anatomical loss. Simplicity is of especial advantage in prosthetic apparatus. If too complicated, the men lose confidence in it and throw it aside.

The form of appliance used will depend upon the requirements of the individual and the occupation that he expects to follow. For example, in place of his forearm, he might require a plaster cone to which could be attached a fork, a spoon, a hook, or a tool holder, or he might need an artistic prosthesis. A "peg" leg that may be replaced by a more esthetic type on holidays is most suitable for a certain class of manual worker. After the stump is in a proper condition and a suitable limb is fitted, the patient must be trained to use it.

The size of the task in connection with amputations may be estimated from the statement that from $2\frac{1}{2}$ to 3 percent of the Belgian wounded have suffered amputation. In France there are approximately 50,000 soldiers who have lost one or more limbs. Of the limbs amputated about three-fifths are legs and two-fifths arms. At present, artificial appliances of some kind will be needed for 1 percent of all wounded.

In cases of bone injury there is frequently extensive loss of bone, malunion, or sequestra formation and discharging sinuses. These frequently require treatment by bone graft. In any event, recovery is prolonged and tedious. The general physiology of these patients is markedly improved if they can be gotten up and given some form of mental diversion and physical exercise. For them, useful work, carefully prescribed and properly supervised, is highly beneficial psychically and physically.

In injuries in and about the joint, the orthopedist usually meets one of two problems: he must either attempt the restoration of the normal function, as far as possible, or if mobility is to be lost he must select the best position for ankylosis with reference to locomotion or prehension. The postoperative physiotherapeutic treatment will vary with the type of injury. It should, however, permit the patient to be up as soon as possible and it should stimulate him mentally and physically.

The nerve injuries consist in the severance of the nerve by a projectile or damage to the nerve trunk. Suture of the nerve is necessary or it may have to be removed first from the scar tissue in which it is imbedded. Either operation is but preliminary to the tedious process of the protection of the muscle, and the maintenance of its nutrition during the regeneration of the nerve. In

connection with the treatment of nerve and muscle injuries, the statement of Sir Robert Jones is most interesting, "No surgeon should proceed until he is fully satisfied as to whether it be possible to restore the apparently paralyzed muscle. It is only possible to make quite certain by relaxing the muscle and then put it in a position made favorable for recovery. Let it be kept for a long period—at least six months—in a position of relaxation." "Electrical tests cannot be relied upon to give this information."

PHYSIOTHERAPY.

The physiotherapeutic measures adopted to hasten cure and to increase function are, in brief, galvanic, faradic, static, and high tension currents; ionization with sodium salicylate or salt solution; baking, blasts of hot air; baths of many kinds; colored light, massage, gymnastics and exercises of various sorts. Movements initiated by the patient himself are of the greatest value. The exercises first given are simple. For example, those for the legs require walking along straight or irregular lines; stepping over obstacles of various heights and shapes; climbing and descending stairs; or mounting a ladder. For the arms, games involving throwing of balls are of advantage. Calisthenics are useful. The exercises should become gradually more complex until the patients are required to thoroughly utilize their physical and intellectual powers.

The treatment upon which emphasis should be laid is mechanotherapy, apparatus work, but more particularly exercises in the work shop, occupational therapy. The keynote is the adoption of some form of exercise at the earliest possible moment that should be steadily progressive and tending to reduce the use of massage and to increase function.

The use of apparatus varies in the different countries that are now training disabled soldiers. The French are inclined to employ it rather extensively early in the attempt to reestablish function and in developing efficiency in the use of artificial limbs. Amar has devised a number of pieces of ingenious apparatus for graphic analysis of the movements of the worker in regard to space, time, and rhythm. He standardizes the amount of effort required of the disabled as compared with that of the normal man by examination of the urine and by the determination of the respiratory exchange. By the same methods, he ascertains the extent of the handicap under which the man is laboring in doing work, the progress of his improvement, and the efficiency of his prosthesis.

The amount of apparatus, the technic necessary in its utilization, and the large number of men to be trained, would seem to be difficulties likely to prevent its wide usage.

The Germans and English lay especial emphasis on early exercise in the work shop. They find it hastens recovery by giving

mental and manual occupation; if properly prescribed it aids in correcting physical deformity. Patients will persist at an occupation that will produce the desired movements much longer than at gymnastic exercises. For instance, a man with stiff fingers or a stiff wrist will use a duster or a paint brush for hours when he would grasp a spring dumb-bell but for a short time. A patient with a stiff arm or shoulder may use a hammer, a hand-saw, a carpenter's plane, a screwdriver, or brace and bit an entire morning trying to make something when he would soon tire of prescribed exercises.

A man with a stiff ankle may quickly weary of a stationary bicycle, but he would treadle a sewing machine or a fret saw because his mind is interested in the work he is doing. By the choice of occupation with reference to the particular needs of the individual, the patient may be made to accomplish by normal movements results only obtained by repeated massage. Properly prescribed work stimulates the circulation, gives tone to the parts, produces betterment of the mental condition, and causes a corresponding improvement in the general physiology.

While the early admission of the patient to the workshop is desirable, careful record of the effect of the work upon his physical and mental condition must be made, and the efficiency of the prosthesis supplied should be subjected to extensive study. At this period of the training, physiological reeducation should be paramount; vocational reeducation permitted only as it aids in the reestablishment of function. However, the invalid should be made to begin the study of his vocation as soon as he is able. Any delay may impair his will to do so.

THE SELECTION OF A VOCATION.

In the selection of the course a soldier should pursue, the cardinal principle to be observed is that the cripple should be returned to his old place and occupation if possible, to be entirely assimilated by his community. His past experience should serve as the foundation upon which to erect the structure of his reeducation. If injuries render him totally unable to carry on his previous occupation, although careful determination of his physical and mental abilities show him to be reeducable for certain forms of mental and manual occupation; his retraining should be undertaken with reference to his tastes, previous experiences, social condition, physical and physiological capacities, and in regard to the supply of the men reeducated in the particular branch in his community.

Careful individual study of each cripple must be made to determine the special features of his mutilation; the loss of power; and the effect of the injury upon his intelligence before deciding upon a vocation. A decision must be reached as to the best means of

developing injured members, what may be supplied by prosthesis and how such a rehabilitated man will fit into an occupation. The legless have a greater choice of occupation than the armless. Men who have suffered an amputation of the arm, especially if at the shoulder, should be retrained for other than manual labor, if they have the proper mental ability.

Farming, gardening, poultry raising, and wood work are found to be peculiarly helpful in reconstructing the wounded, both in body and in spirit.

RETRAINING.

It is desirable that the soldier to be retrained should be transported to his own town or state, not to be taken in charge by members of his family, but near home, where he may receive visits from them without being under the influences of misdirected sympathy, and without being given an opportunity to become apathetic and useless. A disabled soldier should be sent to an institution which has facilities to provide for both his medical and social requirements. A center outside the large city is best for both his health and morale. During his reeducation the crippled soldier should receive his regular army pay and he should be under military discipline.

The undertaking of reeducation should not be compulsory, as the unwilling pupil will do but little while the man receiving instruction on his own account will usually make rapid progress. The soldier will more readily enter training when he knows that his pension will be based upon his disability and not upon his earning power. The desire for retraining may be increased by propaganda in the daily press, by lectures, moving pictures, and by exhibits. Crippled boys may demonstrate to him that physical handicaps can be overcome. They afford great encouragement during early training when progress is necessarily slow. The acquaintance and records of men who have been trained and are succeeding in an attractive occupation will greatly stimulate the desire for reeducation.

As it is impractical for the disabled soldier to serve an apprenticeship, his training must be thorough. Unless he acquires superior skill and knowledge, employers will lose confidence in the system of reeducation and will not be enthusiastic in their cooperation. The soldier must be convinced that his retraining will give him a distinct advantage, for he knows that unless he has a proficiency recognized by employers as especially desirable, he will be unable to hold his job in competition with a normal workman. Any type of instruction that would tend to place the poorly trained man in the same class with skilled operatives would not only unjustifiedly disturb the standards of wages and labor, but it would

be doomed to failure. Consideration must be given to the intense and natural desire of the soldier to return to his home and to enjoy freedom. Nothing, however, would be more unfortunate either for him or for reeducation than he should be permitted to take a course which would not make it possible for him in spite of his disability to retain his position in the skilled trade for which he had prepared.

The time required for retraining will vary with the vocation selected and the extent of disability. Men may become capable of earning a living as tailors, harness-makers, blacksmiths, draftsmen, tinsmiths, etc., in six months. To become an artisan requires a course of one to two years. The longer course offers a double advantage—an opportunity for the acquisition of practical experience as well as theoretic education. Rehabilitation is a failure unless the reconstructed and reeducated man is presented to society prepared to earn the pay of a given job.

FINDING OCCUPATION.

Each reeducation center should maintain an employment bureau for the benefit of the retrained soldier. This agency should cooperate with employers and with labor organizations in placing its men. Greater precautions than usual should be exercised to determine the conditions of employment, the permanency of the position, the risk, etc.

Where cripples are at work in industries where accidents are common, the liability of employers under the various compensation acts may require certain revision or special insurance rates to meet the situation.

WHAT MAY BE EXPECTED FROM REEDUCATION AND RETRAINING.

Amar, who has had wide experience in reeducation of the disabled of industry, and of soldiers, estimates that 90 percent of the disabled can be made to perform usefully either their former employment or some occupation closely connected with it; 80 percent of the wounded can be reeducated to follow a technical occupation; about 45 percent are capable of earning a normal wage, if 10 percent of these become specialists; 20 percent a part of a normal wage; 15 percent are made capable of performing small duties; and 20 percent are unable to support themselves.

In conclusion, the rehabilitation of the disabled soldier should begin early; it should be scientific, practical, utilitarian, and thorough. It is a sacred task. It increases wealth, instills hope, encourages self-confidence, and promotes morals. It is the noblest blending of a national duty and the science of humanity.

SARCOMATOUS DEGENERATION OF UTERINE FIBROIDS— REPORT OF TWO CASES.

By H. W. MILLS, M.R.C.S. (England), L.R.C.P. (London), San Bernardino, California.

This short paper is the result of reading an article by Dr. L. M. Bowes, which appeared in the July, 1917, number of the *INTERSTATE MEDICAL JOURNAL*, and in which the following statement was made: "Sarcoma as a complication of uterine fibroids has been reported, but is so rare that it need not be given further consideration." This surprised me inasmuch as I had in my own work come across this sequela from time to time, and while regarding it as somewhat unusual had never looked upon it as sufficiently rare to merit reporting in detail. I must confess also that, like many others, I have been content with a cursory macroscopic examination of fibroids removed by hysterectomy, and have only had submitted to microscopic examination those specimens which, to the naked eye, appeared suspicious.

The fallacy of opinion based on such cursory examination is exemplified by the reports of Winter (*Ztschrift. f. Geburtsh. u. Gynäk.*, LVII, H. 1, 1906), who found a percentage of 3.2 percent only in the former class, in a series of 500 cases, but discovered in a further series of 253 cases in which a systematic microscopic examination was made, that the proportion rose to 4.3 percent.

The recent literature on the subject is not very voluminous, the largest series being reported by Witter, whose excellent paper on the subject was read before the Section on Gynecology and Obstetrics, Michigan State Medical Society, 51st annual meeting, at Houghton, August, 1916. In an examination of 6,084 cases of pelvic pathology from the service of Prof. R. Peterson, head of the Department of Gynecology and Obstetrics in the University of Michigan, he found 21 cases of sarcoma, 18 of which resulted from the degeneration of uterine fibroids. He points out that this degeneration may occur:

1. By proliferation of the intermuscular connective tissue.
2. By proliferation of the connective tissue of the vessel walls.
3. By direct changes in the nonstriated muscle cells.

Of his cases, two were alive and well two years after operation; one died a year after operation from tubercular phthisis; one died three years after operation, cause of death not given; in the remainder the late postoperative history is not given.

He rightly labors the necessity of early operation and systematic examination of all fibroids.

W. A. Newman Dorland, April 4, 1916, quotes Giles to the effect that sarcomatous degeneration occurs "frequently" and that the diagnosis cannot be made before operation, and gives the following list of authors, with the percentages in which they found this sequela, attached.

W. J. Mayo, 1½ percent; Miller, 2 percent; Warnekros, 10 percent; Bland Sutton, only 1 in 1,000 cases; Pfannenstiel, none in 1,000 cases; Mackenrodt, 4 percent; Geist, 4.8 percent in 250 cases; Deaver, 1.2 percent in 342 cases; Noble, 2 percent; Martin, Cullingworth, Scharlieb, Haultain, McDonald, and Hirst, 2 percent in 1,714 cases.

Bland Sutton, July 29, 1916, remarks: "Some fibroids are indistinguishable even with the aid of the microscope from the common species of sarcoma; and a few contain transversely striated spindles like striped muscle cells. These myosarcomata, though rare, are intensely malignant.

S. E. Tracy, in his paper, "A Report of 100 Consecutive Cases of Fibromyomata Uteri Subjected to Operation," which appeared in the *Journal of the American Medical Association*, October 21, 1916, found one case of sarcoma, and this patient died of recurrence in 4 months. He quotes from an article by C. Winter published in 1906 to the effect that the frequency of sarcomatous degeneration in uterine fibroids amounted to 4 percent. In a series of 714 cases including his own and those taken from the Reports on the Kensington Hospital for Women from 1893 to 1909 inclusive and from the papers of Cullingworth (*Journal of Obstetrics and Gynecology, of the British Empire*, 1902, 1901, 1903) and Scharlieb (*ibid*, 1902, ii, 323) 11 cases of sarcomatous degeneration obtained.

S. H. Geist, writing in February, 1917, remarks, "Sarcoma of the uterus may have one of three origins, either from the endometrium, the myometrium, or from a preexisting fibromyoma. Those tumors arising from the structures of the endometrium are usually considered to be most malignant, while those arising from the transformation of a fibroid give as a rule a better prognosis." In 1916 he described 2 cases of sarcoma developing in fibroids, one of which recurred fatally within 6 months of supravaginal hysterectomy, and estimated the frequency of such a sequela as 1.5 percent. He advises complete hysterectomy, but quotes Cullen as saying that the immediate results of hysterectomy for sarcoma are not gratifying.

G. W. Outerbridge reports, April, 1917, 2 cases of combined sarcoma and carcinoma of the uterus: The first arose by sarcomatous degeneration of a submucous myoma; in the second a small intramural nodule was found histologically to be a myoma, with areas of definite sarcomatous degeneration.

G. E. Shoemaker reported in June, 1917: "Case I—A Fibroid

of the Uterus with Probable Sarcomatous Degeneration;" "Case II—Sarcoma in the Central Portion of a Uterine Fibroma with Syphilis." In the discussion which followed the reading of this paper, S. E. Tracy remarked that malignant degeneration in the cervical stump after supravaginal hysterectomy occurred in 1 percent of such cases.

W. J. Maroney, September, 1916, reminds us that sarcomatous degeneration of uterine fibroids was described by Virchow in 1862. He gives the percentage of sarcomatous changes occurring in "fibroids with symptoms" as about 2 percent, and remarks that recurrence after panhysterectomy is almost as frequent as after supravaginal hysterectomy.



Sarcomatous degeneration of uterine fibroma (Case II).

He refers to Kelly and Cullen as reporting 1.2 percent of sarcomatous degeneration in a series of 1,400 fibroids, and to Aliche of Leipsic finding 4 percent of such changes in a personal series of 17 cases, and mentions also that in 68 cases operated upon in St. Vincent's Hospital, one case of sarcoma was found.

L. W. Strong, February, 1915, quotes Wornelos and Bumm as giving the percentage of such degeneration as 10 percent—this is the highest estimate I have come across. He remarks on the relative rarity of sarcomatous recurrence after total extirpation of the uterus for myoma, and refers to the statistics of Fleischmann 4 percent, Martin 3 percent, Schottlander 3.8 percent, and Hertel 2.8 percent.

I have, at this time, two cases of my own to report—one, I regret to say, in a most incomplete and fragmentary manner, and the other in detail.

CASE I.

Mrs. R., aged 68, was referred to me on November 21, 1906, by Dr. H. C. Dorman with the history that she had had a fibroid tumor of the uterus for five years, that some hemorrhage had obtained for most of this time, on and off, and that recently a tumor had appeared at the vulval outlet. On examination a sausage-shaped friable mass was found which emerged from the cervix, filled the vagina, and protruded from the vulva; this was removed manually, the cervix sewn up, and a vaginal hysterectomy immediately done. The pathological report was: "Sarcomatous degeneration of a submucous fibroid of the uterus." Death from generalized abdominal sarcomatosis occurred five months later.

I very much regret to say that both the specimen and the detailed pathological report in this case have been lost.

CASE II.

Mrs. B., housewife, aged 48, 3 children, 1 miscarriage.

Family History.—Father died aged 47, of pneumonia; mother alive, aged 69, in good health; brothers 3, all alive and well, aged 34, 32, and 26; sister 1, aged 30, in good health.

Previous History.—Typhoid fever at the age of fourteen. At the age of 25, following the birth of her second child, she began to fail in health, had a good deal of pelvic pain, and menorrhagia, and became neurasthenic; at the age of 35 she consulted a surgeon who discovered a large uterine fibroma. For the past ten years she has been a semi-invalid.

Operation.—February 24, 1916. Supravaginal hysterectomy.

Pathological Report.—(By Dr. Walter V. Brem of Los Angeles.) The fibroma of the uterus, in which you suspected malignant changes, shows a large spindle-cell sarcoma. The wall of the uterus contains a firm tumor about the size of a small orange. On sectioning it is seen to have a lobulated appearance, to be white in color, with the central portion quite soft. The lobules have a homogeneous appearance. Frozen sections—Hematoxylin-eosin stain used. The sections show the tumor to be made up of large deeply staining spindle-shaped cells. The cells seem to be arranged in bundles, some being cut transversely, others longitudinally. In a section from one portion of the tumor a moderate amount of fibrous tissue was seen. Sections from other portions do not show any. No muscle fibres were seen. Occasional small blood vessels are scattered throughout the tumor. The tumor cells are arranged around them in whorls. Sections from the wall of the uterus show normal muscle.

Diagnosis.—Sarcomatous degeneration of a uterine fibroid.—An original drawing by a skilled pathological artist (Miss E. C. Forster of Los Angeles), was made, and from a photograph of this the accompanying cut is here reproduced.

On December 7, 1917, I carefully examined this patient, and found her quite well and free from any evidence of recurrence. She has gained 20 pounds since her operation and is working regularly.

I report this case, not as an example of "surgical cure"—it is too early for that—but at the request of Dr. Bowes, because of the relative infrequency of this complication of fibroid tumors of the uterus.

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A MUSCLE PLASTY FOR THE RELIEF OF FLAIL ELBOW IN INFANTILE PARALYSIS.

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The following operation was devised to meet a condition not uncommonly encountered in paralysis of the upper extremity. As it is well known, the distribution of paralysis in hand and arm, as a rule, is such that the muscles of the more proximal joints are more seriously affected than those of the more distal joints. This is quite in contrast to the conditions usually found in the lower extremity. Here the paralysis is usually most pronounced in the muscles of the foot and leg, while in the upper extremity the hand very often escapes paralysis. Not infrequently we find the following condition:

The muscles of the shoulder joint are seriously paralysed; the muscles of the elbow joint are likewise paralysed so that a condition of flailness exists in both joints. At the same time the muscles of the hand and wrist may have escaped paralysis to a remarkable degree.

When one analyzes this condition one finds that the function of the extremity is most severely handicapped by the loss of action in the elbow. The arm is hanging down along the side of the body, and any action of the hand has to be preceded by passive flexion of the elbow with the aid of the other hand. No matter how well preserved the function of the fingers may be, the hand must be guided by the other hand into a position of flexion at the elbow.

The problem of the flail elbow has always been a very difficult one. Arthrodesis cannot be thought of in children under 14 or 15 years of age; the silk ligament fixation of Bartow and Plummer might possibly hold out some better hope, but the reports on this method are still very scant.

I am presenting this operation which I believe will meet the following condition: A flail elbow, with or without a flail shoulder and with well preserved muscles of the forearm and fingers. The purpose of the operation is to impart active flexion upon the elbow joint by means of a muscle plasty which transplants the origin of the flexors of the wrist in such a way as to cause them to act as flexors of the elbow.

The technic is as follows: An incision is made on the side of the humerus beginning three inches above the internal epicondyle between the brachialis internus and triceps muscles, down to the in-

ternal epicondyle and from there over the anterior aspect of the forearm obliquely downward and outward in the direction of the pronator teres muscle. Then, beginning from the lower half of the incision the superficial and deep fasciae of the forearm are cut and the superficial layer of the flexor muscles of the forearm is carefully dissected. These muscles are the pronator teres, flexor carpi radialis, palmaris longus and flexor carpi ulnaris. This superficial layer of muscles is carefully prepared and dissected off its insertion at the epicondyle, taking with it the periosteum. At this



Fig. 1.—Flexor muscles dissected off the internal epicondyle.

step it is very advantageous to look up the ulnar nerve and protect it from possible injury. After this superficial muscle layer has been dissected off its insertion, it is followed and carefully freed for two or three inches downward, care being taken not to injure the median nerve as it descends between the two heads of the pronator radii teres (Fig. 1).

Then this common muscle bundle is drawn upward under strong flexion of the elbow joint. The inner surface of the humerus is approached, by blunt dissection, through the intermuscular septum between the brachialis anticus and triceps. The periosteal cover-

ing of the humerus is split longitudinally, the freed muscle ends are then pulled upward two or three inches above the epicondyle, and fastened over the denuded bone by sutures to the edges of the periosteum. The fasciae are then sutured and the skin closed (Fig. 2).

The arm is put up in splint in extreme flexion and held there for six or eight weeks. After-treatment is begun after three weeks, and consists in careful active flexion movement of the elbow and



Fig. 2.—Origin of flexor muscles transposed upward 2 inches.

massage. I have used this method in seven cases, four of which have given good results, and are presented in this paper. The remaining three, failures, can be attributed entirely to error in judgment in regard to the muscle power of the forearm muscles.

It is evident that the forearm muscles must be entirely intact or almost so, if they are to be expected to perform the heavy task of lifting the forearm against the humerus, a function so different from the physiological action of flexing the hand against the forearm.

CASE I.

E. M., aged 9 years. Admitted March 1, 1916, with history of an attack of infantile paralysis two years previously, residual paralysis of the right arm, involving all the muscles of the elbow except the triceps.



Fig. 3.—Case I, before operation.



Fig. 4.—Case I, three weeks after operation.



Fig. 5.—Case II, before operation.



Fig. 6.—Case II, three weeks after operation.



Fig. 7.—Case III, before operation.



Fig. 8.—Case III, four and one-half months after operation.



Fig. 9.—Case IV, before operation.



Fig. 10.—Case IV, three weeks after operation.

All muscles of the hand and forearm are in good condition. Flexion of the elbow is only possible to a very slight degree by pronator teres, after the hand is brought to 120° flexion by the aid of the other hand and forearm. The shoulder is completely paralysed.

Operation.—February 7, 1917. Muscle plasty; technic as described above. Report two and a half months after operation: the elbow can be flexed actively about 45°, with fingers either open or closed. Under persistent after-treatment the muscle power of the elbow is constantly increasing.

Report one year after operation: muscle power of the elbow has further increased (Figs. 3, 4).

CASE II.

I. T., aged 8 years. Admitted December 30, 1916. Infantile paralysis existing for four years. Residual paralysis of the right shoulder and elbow. The elbow is held in overextension, no active flexion of the elbow being possible. Patient has good pronation and fair supination. All movements of the wrist and hand are good. The muscles totally paralysed are: biceps and brachialis anticus in the elbow, deltoid and infraspinatus in the shoulder.

On March 3, 1917, a muscle transposition was performed, technic as described above. Report six weeks later: the arm can be flexed actively in the elbow up to 60° with the fingers extended. Report eight months later: active flexion of the elbow is possible to 60° (Figs. 5, 6).

CASE III.

M. S., aged 7 years. Admitted April 14, 1917. Infantile paralysis existing five years. Residual paralysis of the left upper extremity. Left shoulder is entirely paralysed. The left elbow is also paralysed with slight contraction of pronator teres. On admission the function of the elbow is as follows: The arm hangs down at the side of the body, absolutely no active flexion of the elbow being possible.

Operation.—April 19, 1917. A muscle plasty of the elbow is done, technic as described above.

Report two and one-half months after operation: the patient is able to execute active flexion at the elbow with the fingers open or closed. The patient is given after treatment consisting in massage and exercises.

Report seven months after operation: flexion power of the elbow is further improved, so that the patient is now able to bring the forearm up to 60°.

Report nine months after operation: further improvement of muscle power. Total range of motion of the elbow is 120° (Figs. 7, 8).

CASE IV.

D. B., aged 10 years. Admitted March 15, 1917. Infantile paralysis of four months' duration, involving left lower and left upper extremity. Total paralysis of left shoulder and elbow. The action of the fingers is fair, forearm is moderately paretic, having about one-half of the normal muscle power with the exception of the abductor pollicis longus. The pronator teres is well developed, slightly contracted.

Operation.—September 6, 1917. Muscle plasty at the elbow, technic as described above. Examination two weeks after the operation shows decided action of the forearm. Patient is able to flex elbow from 100° to 70°.

Report five months after operation: flexion power at the elbow has increased and patient is able to actively flex elbow, although not without difficulty (Figs. 9, 10).

In regard to the indication of this operation, one may say that the requirements for it were met fully in the first three cases, the

patient having almost normal control of the fingers and wrist. In the fourth case the indication was doubtful, but the operation was found justified by the attending results. In three other cases, however, in which the function of the fingers had been impaired, the indication for this operation clearly did not exist and consequently the operation was not attended by proper results.

In conclusion I may resume that this method promises to give good results if properly carried out, and if one is not tempted to apply it unless sure of very satisfactory function of the forearm muscles. It is evident that the muscle power imparted to the elbow is obtained at the expense of the flexion power of the hand and fingers and for this reason one must be very judicious in making the indication.

SOME CONSIDERATIONS REGARDING MARRIAGE AND PREGNANCY IN CARDIAC DISEASE.

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The question of marriage in women with cardiac disease is one which evidently requires careful consideration. The chief dangers arising from marriage in such cases are twofold: the strain and excitement incidental to coitus, and those dangers arising from pregnancy. Regarding the former, I know of several instances of hemoptyses immediately following coitus in patients with mitral stenosis and auricular fibrillation (complete irregularity of the pulse), and in one with cardiosclerosis and hypertension. I have also observed several cases of violent tachycardia caused by intercourse. With one exception, the cardiac condition of all of these patients would have been considered fairly satisfactory under ordinary conditions.

Views regarding the advisability of permitting marriage in women with cardiac disease are quite at variance. For example, some maintain that patients with heart disease should never marry, no matter what type of lesion. I believe this view to be extreme. One frequently encounters mothers of large families who doubtless have had valvular disease for many years, and who have gone safely and normally through pregnancy and parturition. Many of these patients were never aware of their disease: in some the lesion was discovered only in the course of a routine examination.

The statistical tables of the lying-in institutions that I have studied have, in my opinion, very little value in clarifying the problem. The statistics are based chiefly upon patients that entered the hospitals severely decompensated: a cardiac history prior to pregnancy or to decompensation is entirely disregarded or only cursorily mentioned. To be of value, cases must be carefully studied from the cardiac as well as from the obstetrical standpoints; this requires the cooperation of internist and obstetrician, or the skilled observation of that rare combination, a clinician who has had a large, active obstetrical experience.

Marriage naturally should not be advised, if the patient shows the slightest degree of decompensation. Briefly, decompensation is evidenced by the presence of dyspnea, especially on exertion; by edema of the extremities; an enlarged liver; bronchitis; cyanosis, and by arrhythmias. The latter are chiefly, extrasystoles (pulsus bigeminus), auricular fibrillation (complete irregularity of the pulse)

and tachycardia. I wish to emphasize, however, that arrhythmias in themselves (except possibly auricular fibrillation) do not necessarily indicate either heart disease or decompensation. In those who have only recently recovered from heart failure, it is a safe rule to interdict marriage until at least two years have passed, without any further break in compensation. An exception is noted later with reference to aortic lesions and extreme cardiac hypertrophy. The interval mentioned—two years—is, of course, purely arbitrary, but seems to agree best with clinical experience. In valvular lesions the same time should be set as a safe interval in which no inflammatory symptoms have occurred. If, for example, there have been rheumatic endocarditic recrudescences, as evidenced by louder murmurs, slight febrile attacks, pericarditis, tachycardia, arrhythmias, or other clinical manifestations, marriage should not be advised, for the chances are in favor of another attack within one year. In short, marriage (and pregnancy) may be considered safe if excellent compensation and freedom from endocardial exacerbations persist during the two-year period. The physician who has not had the opportunity to observe the patient within the prescribed antenuptial period must necessarily be guided by the history and physical signs.

Of the two factors, decompensation and quiescence of the lesion, I believe that the latter is the more important. In my experience, more danger and more fatalities have resulted in pregnancies from marriage occurring when lesions were active than from mild decompensation. Gestation seems to light up dormant or only partially active cardiac processes.

Cardiac symptoms frequently begin early in pregnancy, sometimes even in the third month. At the beginning, simple pulse acceleration or sudden sharp acceleration occurring in attacks (technically called paroxysmal tachycardia) may be present. Slight fever may appear; when due to endocardial exacerbations, it is of serious import. The occurrence of new or louder valvular murmurs, or of fresh pericarditis, may furnish clues of such recrudescences. Hemoptysis is not infrequent. As pregnancy advances, unless above or similar manifestations recede or are checked, dyspnea and cyanosis gradually supervene, and with them the usual symptomatology of frank cardiac decompensation: edema, orthopnoea, enlarged liver, pulmonary congestion, arrhythmias (especially extrasystoles), etc. The greater circulatory demands made by the growing placental and fetal circulation very probably also play a role in causing this heart failure. Labor, induced or spontaneous, does not always terminate the circulatory embarrassment, for insidious endocarditis may continue, and death result from some complication or from circulatory failure.

The above considerations refer to marriage in women with all

types of valvular lesions. It remains to differentiate partially between these on the basis of clinical experience. I have found that rheumatic mitral stenotic lesions are the most dangerous during pregnancy. The patients readily develop paroxysmal or, more often, simple tachycardia, which may last during the greater part of pregnancy. The rapid heart action itself may produce such dyspnea or discomfort that the induction of premature labor is indicated. Hemoptyses are common. Bronchitis with sibilant breathing and mucous rales over the entire chest are not unusual. As occasional complications during the puerperium, one may mention embolic infarcts in the lower extremities or in the lungs.

The history of pregnant women with mitral stenosis and auricular fibrillation presents a varied clinical picture. Some of these patients date their first break in compensation at a first or second pregnancy which had been carried to full term. On the other hand, I have observed patients who went through successive pregnancies with mitral stenosis and auricular fibrillation, with no cardiac complications or symptoms. One of these deserves brief mention: When first examined, she was fifty years old, with general anasarca, orthopnea, auricular fibrillation, a double mitral lesion and an old rheumatic history. She had had eighteen children without cardiac symptoms. The latter began only three years after her menopause which commenced when the patient was forty-five years old. From her history, it seemed probable that fibrillation had been present at least during her later pregnancies. Another patient, 53 years of age, was the mother of five children. She had a rheumatic history and double mitral lesion with auricular fibrillation for many years. During her pregnancies, the cardiac symptoms were very slight and of the same nature as those occurring when she was not pregnant; these consisted in occasional dyspnea and tachycardia.

Except by means of the general considerations above outlined, there seems to be no way of determining in advance the favorable or unfavorable subjects for pregnancy, in those with auricular fibrillation. Extreme caution in advising marriage or pregnancy is, of course, necessary because of the known tendency of patients with this arrhythmia to decompensate.

Patients with simple mitral regurgitant lesions are the most favorable subjects for pregnancy and the most apt to go through gestation without untoward cardiac complications. When the latter do occur, they are more often of the mild decompensatory type from recurrence of the endocarditis.

Pregnant women with aortic lesions suffer chiefly from tachycardia. This is true of those with, as well as those without marked ventricular hypertrophy. In the latter, however, tachycardial attacks occur more frequently, are more readily invoked and are of

longer duration. Decompensation is comparatively rare in those with only moderate or slight hypertrophy; when extreme, cardiac failure is apt to occur early in pregnancy, a tendency increased by the rapid heart action. Such patients should be advised against marriage or if already married should not be permitted to become pregnant even if the lesion is quiescent and compensation in the non-pregnant state is good.

In all types of decompensated endocardial lesions occurring during pregnancy, the question of the induction of abortion or of premature labor arises. Severe cardiac failure in early pregnancy (before the fourth month) or slight decompensation which does not yield to treatment is, I believe, an indication for immediate emptying of the uterus. This indication is not vitiated by the fact that some of these mothers may, by protracted rest and medication, carry the child to viability or even to full term without further complications. The life of the mother is the prime consideration and should not be jeopardized, as it would be, in an attempt to continue the pregnancy when cardiac decompensation is present in early gestation. My observation has been that an abortion, surgically clean and skillfully performed, is only slightly, if at all, more dangerous in cardiac patients than if performed for other reasons on those with normal hearts. I am also strongly in favor of terminating an early pregnancy if it is evident that there exists a continuance or recrudescence of endocarditis. As already stated, this may consist in the presence of fever, in the onset of paroxysmal or constant tachycardia, of extrasystoles or other arrhythmias, of frequent hemoptyses, and of changes in the physical signs.

If the signs of decompensation, or of fresh endocarditis, appear between the end of the fourth month and the time of viability, in view of the somewhat more serious operative procedure required to induce miscarriage, the decision regarding interruption of gestation hinges chiefly upon the severity of the cardiac complications. If decompensation is mild or the evidence of fresh endocarditis not severe, appropriate therapy should at first be attempted for about a week or ten days. Should the symptoms then disappear and the patient improve, pregnancy may be allowed to proceed until the period of viability, possibly until normal labor. If decompensation or endocarditis does not react well to therapy or becomes suddenly severe and threatening, it is much safer to induce miscarriage.

In the interim between the seventh and the ninth months of gestation, the decision regarding the interruption of pregnancy in decompensated cases or in those with recrudescing endocardial lesions is of less vital importance, because the premature induction of labor in proper hands adds scarcely any risks. The question of waiting a month or two until a more natural process of normal labor occurs must depend upon the cardiac condition; that is, if there is

any reason to fear the slightest increase of cardiac complications, it is both wiser and safer to have pregnancy terminated soon, than to wait until full term.

In addition to the causes given which may interfere with and complicate pregnancy in women with cardiac disease may be mentioned cardiac neuroses. Patients with various types of valvular diseases perfectly compensated and with no new outbreaks of endocarditis for years, may, because of their knowledge of their cardiac disease and because of their dread of childbirth, present cardiac symptoms of a neurotic type which in themselves may call for interruption of pregnancy. Two such cases may be epitomized:

CASE I.

Mrs. K., aged 21, married one year and now pregnant three months, has had a rheumatic, double aortic lesion for years. In the past ten years her only complaint has been occasional palpitation due to moderate tachycardia. Since her pregnancy, she has had frequent crying spells because obsessed with the idea that she would die during childbirth. She complained almost continuously of palpitation. Examination revealed, besides the valvular lesion, moderate left ventricular hypertrophy and a cardiac rate of over 100 per minute. Compensation was perfect. Because of the nervous condition the induction of miscarriage was advised. She was told, however, that if at a subsequent pregnancy, she were less nervous, she might carry the child to full term with no danger to her heart. Curettage was performed under gas and ether without untoward symptoms. Within one year of the operation she again became pregnant. There were no neurotic or cardiac symptoms, no tachycardia or palpitation. She carried the pregnancy to full term, the delivery and puerperium were normal.

CASE II.

Mrs. L., married two years, is now pregnant six weeks. She has a typical double mitral lesion. Despite the valvular disease, she was always active as a child and has never suffered from decompensation. She is of a very neurotic temperament and is easily frightened. Under such circumstances she suffers from palpitation, which, on examination, is found to be due to rapid heart action, usually at the rate of 110 per minute. When first consulted, I advised her that the continuation of the pregnancy would depend more upon her general nervous condition than upon her heart, that the former affected the latter, and that if she were not nervous and frightened, there would be no reason to worry about the condition of her heart; her heart was in as good condition as it would ever likely to be. Mixed bromides were given. Ten days later, she again consulted me. She feared she would lose her life if pregnancy continued. She had been having sleepless nights and crying spells. Palpitation had been frequent, almost constant. I therefore advised immediate termination of pregnancy, though compensation was perfect. In this case I also feel that a future pregnancy may be carried to full term without mishap if the patient does not become frightened and nervous.

The medical treatment of the various cardiac symptoms occurring during pregnancy may now be briefly sketched. Decompensation, no matter whether evidenced by circulatory congestion (enlarged liver, edema, bronchitis, dyspnea, cyanosis, or by arrhyth-

mias) calls chiefly for digitalis and rest. I believe that patients should be brought under the influence of the drug as quickly as possible. Where cardiac failure is extreme, the case urgent and digitalis has not previously been given, it is best to begin with the intravenous or intramuscular injection of strophanthin (dispensed in ampoules in a 1-1000 solution) : the dose is 10-15 minims: When given intravenously, it should be injected slowly. After twelve to twenty-four hours, digitalis in the usual doses can be given. I am in the habit of prescribing the tincture in 15-minim doses three or four times daily, it should be given undiluted. The average amount for a full effect is 1 ounce, distributed over a period of about one week. When dyspnea or restlessness is marked, or pulmonary edema is present, occasional doses of morphine are indicated. Special diet is sometimes of value in getting rid of edema. Where the urine output is normal in amount, I have found restriction of fluid intake in twenty-four hours to 1,000 c.cm. of milk (Karrell diet), or of that amount or even considerably less of other fluids (e. g., water, lemonade, weak tea) for two or three days in succession, combined with the administration of theobromine-sodium salicylate in 7½-grain doses three or four times daily of decided advantage. To appease the hunger pangs, where present, dry toast or baked apples may be added.

For the treatment of endocarditic recrudescences the salicylates are required; they should be administered up to their physiological limit. I usually give the salicylate of soda in one gram doses until eight doses have been given or until tinnitus occurs. The dose is then decreased or medication temporarily discontinued. I have found no beneficial results from serums, vaccines, or from preparations of silver salts. Unfortunately, salicylates are sometimes of little or no value. Ice bags occasionally control rapid heart action. They are to be discontinued if no effect follows their use or if they make the patient uncomfortable.

The chief types of irregularities have been mentioned. If arrhythmia is the result of decomposition, digitalis should be given in the usual manner. If due to fresh endocarditis, besides the salicylates, bromides in large doses may be of value, especially in the presence of tachycardia. Arrhythmias (usually extrasystoles) which are occasionally caused by digitalis soon after it has begun do not contraindicate its further use if the object of the medication the restoration of compensation, had not been accomplished.

IMPROVED APPROACH TO THE KIDNEY.

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It is a sound surgical principle to reduce as much as possible the amount of destruction caused by the steps necessary for the exposure of the organ which is intended to be the subject of surgical intervention. The attempts to simplify in this sense, the methods applied to exposure of the kidney date quite far back.

When L. L. McArthur suggested the gridiron separation of the abdominal muscles in appendectomy, he already mentioned that this procedure may also be employed for the exposure of other intra-

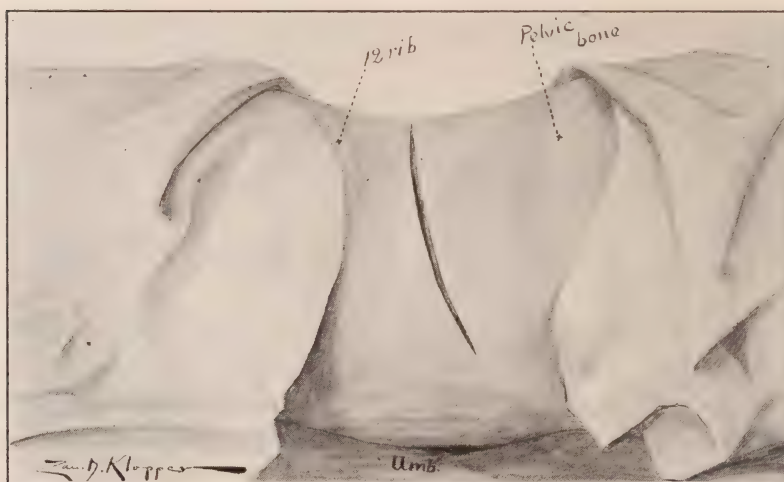


Fig. 1.—Skin incision.

abdominal organs. Later on Swedish surgeons proposed to utilize the triangle of Petit in order to expose the kidney, without cutting the covering muscles, and this suggestion was taken up and practiced by quite a few surgeons. It is, however, impossible to employ this latter procedure as a method of routine, and this for the following reasons: Petit's triangle, in the majority of cases, is not very distinctly developed, and, on account of its low location, using it will be impracticable in all cases in which the kidney is placed rather high up. At that, even if the kidney should be located sufficiently low, the exposure of kidneys of any but the normal size is insufficient by this route, and a short pedicle cannot be satisfactorily handled through this funnel-shaped opening. Still, the advantages

of separating the muscles or their fibers instead of dividing them with the knife are easily appreciated.

The knitting together of muscle stumps is always a precarious proposition, and even in case of a satisfactory coalescence a long

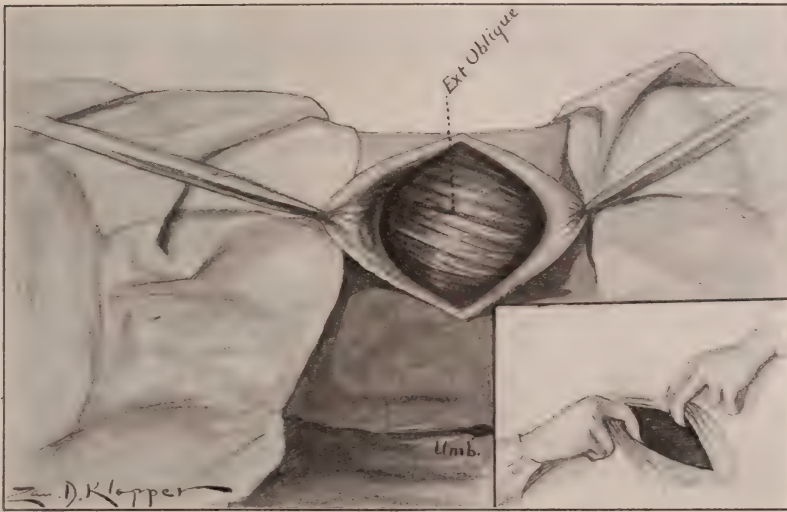


Fig. 2.—The skin flaps are undermined and the external oblique is exposed.

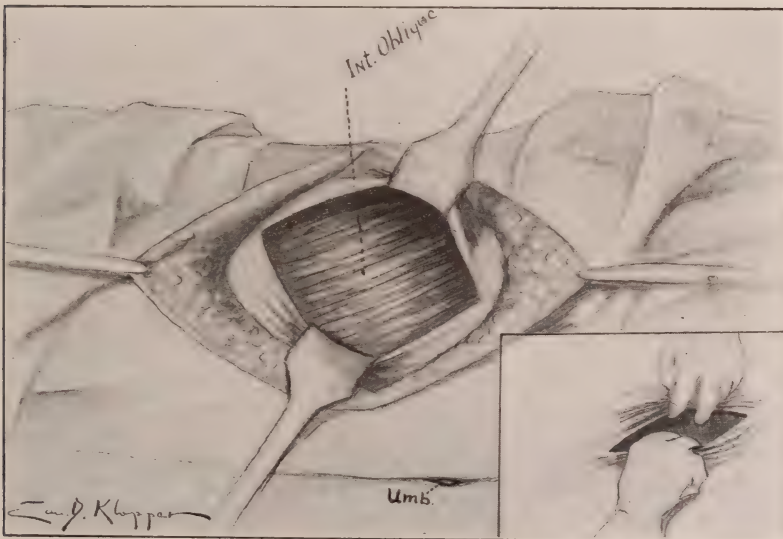


Fig. 3.—By retraction on the cleft in the external oblique the internal oblique is exposed.

time is necessary for the resumption of the muscular functions, and for many months after the operation numbness in the flank and hypogastric region and other disagreeable sensations will persist, and are a source of great annoyance to the patient.

On the other hand, the simple separation of the muscles or muscle fibers does not produce any hemorrhage, the conditions of the wound are simplified, no important nerve trunks are severed, recovery and *restitutio ad integrum* are accomplished in a very short time.

The gridiron exposure of the kidney became practicable in and applicable to the great majority of renal operations after it once was recognized that the main obstacles to such an exposure of the kidney are based on the resistance of the skin and of the fasciæ, and not on the resiliency of the muscles. After the skin is mobilized and after the covering muscles are denuded and divided, persistent traction brought to bear on the clefts in the muscles will widen the field of operation to any desirable extent. And even

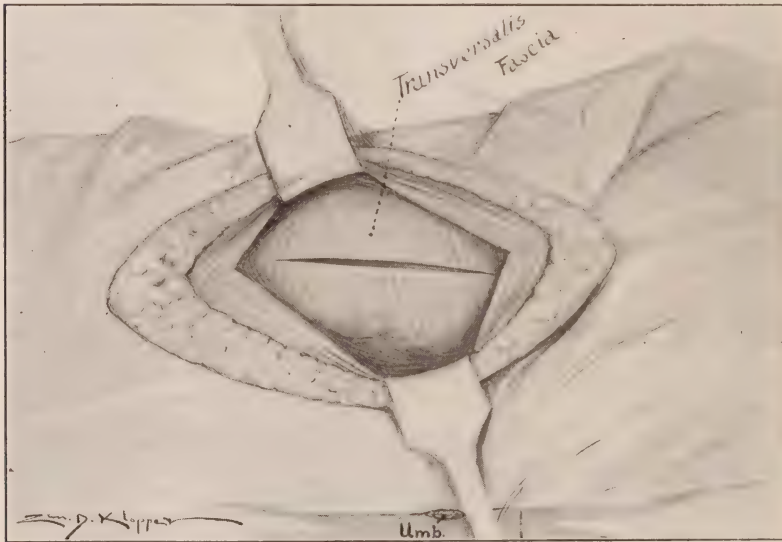


Fig. 4.—By retraction of the separated muscle fibers the fascia transversa is exposed and incised in its central portion.

if, in dealing with colossal renal tumors or pyonephroses, this procedure should turn out to be insufficient, the chance of additional incision of the muscles, if deemed necessary, is still present.

In detail the operation is conducted as follows: The patient is placed on the operating table in such a way as to make his flank protrude. The skin incision is made half way between the twelfth rib and the crista ilei, and parallel to the rib, beginning at the anterior edge of the latissimus dorsi, and slightly slanting downward the center of an imaginary line running from the umbilicus toward the spina superior ilei. This incision is deepened until not only the subcutaneous fat, but also the fascia, is severed. Then both lips of the wound are undermined to the extent of two or three inches, the operator being mindful of taking along the fascia with

the cutaneous flaps. Retraction of the flaps will now expose the obliquus externus. Its fibers are separated bluntly in the center of it, and retractors inserted into this slit will by steady pull expose the internal oblique. Again this muscle is divided bluntly right through its center portion. This division and proper retraction will, as a rule, take the transversus along; only, if this muscle is very well developed, it will also have to be divided separately in the manner above described.

This brings the operator to the last covering of the renal niche, the fascia transversa, which is split vertically with the knife. If large retractors are now inserted with their flanges way down to the bottom of the wound, steady traction exerted on them will expose the field of operation to full satisfaction.

After the necessary surgery on the kidney is completed, the central elevation of the operating table is flattened out, which leads to the collapse of the wound cavity. The fasciæ are now reunited by sutures and the insertion of tension sutures and the approximating of the skin edges completes the job.

THE INTRAVENOUS USE OF TARTAR EMETIC IN TREATMENT OF MALARIA.

By M. D. LEVY, M.D., and DICK P. WALL, M.D.

SUPPLEMENTARY REPORT.

Stimulated by the promising results reported by Rodgers,¹ with the use of tartar emetic administered intravenously in cases of malaria, we were led to make a trial of this drug in the hope that a remedy would be found for the malignant cases of malarial infection that not infrequently present themselves for treatment in this clinic.

In our first series of cases the drug was used only in infections of tertian malaria. These cases formed the basis of our first report,² our results being that we found the administration of tartar emetic unattended by any uncomfortable reactions, that it reduced the temperature, brought about a feeling of well being, caused a marked reduction in size of malarial spleen, but did not free the blood of plasmodia.

Rodgers recommended the use of the drug especially for the cases of estivo-autumnal infection that resist quinine treatment so stubbornly. Low and Newham³ reported a case of estivo-autumnal infection treated with tartar emetic intravenously with negative results. Stephens⁴ and his associates used this treatment in twenty-two cases of malaria, administering doses varying from 5 to 15 c.cm. of a 2-percent solution into the blood stream. No effect either upon the chills or the presence of plasmodia in the blood stream was noted. Greig⁵ observed during the course of the treatment the appearance in the blood stream of the tertian organism in one case, and in another the appearance of the estivo-autumnal forms, showing that apparently the drug has no effect upon the asexual forms of the parasite. Falconer and Anderson⁶ reported eight cases, tertian and estivo-autumnal, with no effect on the tertian organisms. Crescents disappeared from the peripheral blood, but the patients had three typical malarial chills during the treatment.

We have tested the value of tartar emetic in some ten cases of estivo-autumnal infection, with uniformly negative results so far as freeing the blood of parasites was concerned. Its effect on the other symptoms and signs was also practically negligible, no permanent change being noted in the size of enlarged spleens or upon the temperature curve. In all our cases a fresh 2 percent solution of tartar emetic was used, being sterilized by boiling just before administration. We began with doses of 1 or 2 c.cm. intravenously,

and increased the dosage up to 6 c.cm., administering treatment intravenously twice a week. A word of warning just here is in order: especial care should be exercised in administering the drug, in order that there should be no leakage into the subcutaneous tissues. In two cases of our series in which this occurred, severe pain was complained of, a hard brawny swelling of the parts resulted and herpetic like lesions appeared around the site of injection. Under alcohol compresses and magnesium sulphate dressings, the swelling subsided with no suppuration.

Only two cases of our series are reported in detail, these cases noted below, having some interest aside from the effect of tartar emetic on the plasmodia.

CASE I.

J. V., a Spaniard, aged 25, waiter by occupation, presented himself for treatment in the out-patient clinic of the John Sealy Hospital on October 16, complaining of fever coming on at irregular intervals and increasing general weakness. Examination in the clinic revealed a large easily palpable spleen and a blood smear showed marked anemic changes present, with an occasional normoblast. The patient was sent into the hospital and as happens often after putting ambulatory cases to bed, ran a normal temperature. Examination in the wards showed patient to be lightly jaundiced, the hands having a yellow transparent-like appearance. Spleen was tender and palpable 5 cm. to right of umbilicus and 15 cm. below costal margin. Liver not palpable. There was present a soft systolic murmur heard best in pulmonic area, transmitted equally in all directions. Blood pressure, systolic, 115, m.m. hg.; diastolic, 65 m.m. hg. A blood count done the following day showed: red blood cells, 1,288,000; hemoglobin, 36 percent; color index, 1.39; white blood cells, 3,900; polynuclears, 57 percent; lymphocytes, 40 percent; transitionals, 1 percent; eosinophils, 2 percent; anisocytosis, poikilocytosis, and polychromatophilia, slight; no plasmodia seen. Stools, urine, and blood cultures were all negative. A tentative diagnosis of pernicious anemia was made and the usual remedial measures instituted. On October 20 another examination of a blood smear showed marked anisocytosis, poikilocytosis, polychromatophilia, and basophilic stippling of the red blood cells with numerous crescents of the estivo-autumnal type of malaria; there being about 800 per cubic centimeter present. It was decided to try out the effects of tartar emetic on this patient and on October 22 1 c.cm. of a 2 percent solution diluted with 20 c.cm. distilled water (to obviate any discomfort from a probably too great concentration of the drug) was injected intravenously. This was followed on the 20th with an injection of 2 c.cm. and on the 29th with 4 c.cm. Following the first and third injections the patient felt sick and dizzy and vomited. There was no reaction following the second injection. Notes made on the 26th showed that the spleen was noticeably reduced in size, not tender and the color of the patient was much clearer. A blood count on the 31st showed: red blood cells, 3,000,000; Hb., 50 percent; color index, 0.82; white blood cells, 6,000; polynuclear, 68 percent; lymphocytes, 24 percent; eosinophils, 7 percent. Some poikilocytosis and anisocytosis were present, but no plasmodia were found after a long and careful search by three observers. Patient began vomiting on 31st, and temperature of 100.4° F. was noted, the first fever since admittance. Tartar emetic solution, 6 c.cm. was injected intravenously on November 1, and again on November 5. Severe vomiting followed the first injection. Temperature became irregularly remitting, spleen became noticeably larger, but blood examination on November

5 was still negative for plasmodia. On November 9 many rings and crescents were found in the blood. Tartar emetic was stopped, and quinine and urea hydrochloride, $15\frac{1}{2}$ grains, administered intravenously every day from November 9 to November 25. Temperature became normal after first quinine injection and no subsequent rises occurred. Spleen became much smaller and the patient's general condition rapidly improved. A blood count made November 23 showed: red blood cells, 4,272,000; hemoglobin, 85 percent; color index, 1; white blood cells, 9,400; polynuclears, 65 percent; lymphocytes, 30 percent; transitionals, 1 percent; eosinophils, 2.5 percent; basophils, 1.5 percent. No plasmodia were reported, however, an examination on November 21 revealed many crescents present. During the antimalarial treatment blood tonics such as Blaud's pill were also administered. In the next bed to this patient was another case of estivo-autumnal malaria treated with the same dosage of tartar emetic, taken from the same bottle, and this patient showed none of the reactions noted above. The effect on the plasmodia, however, was no more successful, this patient also receiving quinine intensively before being discharged from the hospital.

CASE II.

P. G., negro school boy, aged 12 years. Previous diseases measles and whooping cough. About the 1st of August he had chills and fever lasting for three days. Was in bed during attacks of fever and after sitting up a few days noted swelling in his feet, which rapidly spread up to his abdomen. Entered hospital because of this swelling. A blood count made when patient was admitted showed only a slight grade of secondary anemia and no plasmodia. The urine was scanty, highly colored and contained a large amount of albumin with many coarsely granular and hyaline casts. Under eliminative and dietetic treatment, with rest in bed, the edema and acites gradually disappeared. After disappearance of the ascites the spleen was palpated 4 cm. below the costal margin. Repeated examinations of the blood were made for malaria and on September 25 a few rings and crescent forms were found. On September 27 1 c.cm. of a 2 percent solution of tartar emetic was administered intravenously, followed on the 30th with 2 c.cm., and on October 3 with 4 c.cm. Because of the extreme pain complained of following the injections associated with swelling and blister formations on the arms the tartar emetic was discontinued. The blood continued to show a few rings and no change was noted in the size of the spleen. There was no febrile reaction until the arms began to swell. This swelling and the bullae-like lesions, we feel sure, were due to leakage of the tartar emetic into the subcutaneous tissues. Quinine bisulphate, 5 grains, and methylene blue, 5 grains, three times a day was administered by mouth. Blood examinations on October 8, 9 and 16 failed to reveal any plasmodia. Spleen was well up under costal margin. A phenol-sulphonephthalein test of kidney function showed an excretion of .66 percent for the two hours, practically a normal excretion, notwithstanding the fact that the urine showed 3 percent albumin excretion in twenty-four hours, with a few hyaline and coarsely granular casts still present. This patient, after discharge from the hospital, reported to the out-patient department for several weeks for observation. During this time he was continued on the quinine treatment, the urine gradually clearing up.

SUMMARY AND CONCLUSIONS.

In reporting our results with the use of tartar emetic in estivo-autumnal malaria, two cases are given in detail, one whose blood picture and general appearance was that of pernicious anemia, such

a diagnosis being made until plasmodia were found in the blood stream. The second case was, we think, a definite case of nephritis, resulting from infection with the estivo-autumnal plasmodia. Our results in all ten cases studied were disappointing, as we hoped that we could obtain results as happy as those reported by Rodgers. We are forced, however, to agree with the many other investigators of this subject that tartar emetic is not as efficient as quinine in the treatment of estivo-autumnal malaria. We also believe and urge that the quinine administrations be persisted in for two to three months in doses not exceeding 5 grains two or three times a day, as we are of the opinion that only by such method will we be able to truly cure estivo-autumnal infections.

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ATROPHIC RHINITIS.

By SELDEN SPENCER, M.D., St. Louis.

If of making many books there is no end, certainly of writing many medical articles there is no end. Were apologies not bad introductions, I would feel tempted to apologize for choosing a subject which has been so freely handled of late. But, like the poor, atrophic rhinitis is always with us, and it is more or less one of those bug-bears with which we have to deal. If I should not succeed in presenting anything new, or in throwing new light on this subject, I hope, at least, to open a discussion that may prove beneficial.

Search through the literature concerning this affection shows much diversity of opinion regarding the etiology. Even modern rhinology is somewhat at sea as to the exact etiology, and as to the histological changes which take place. At any rate, there does not seem to be a consensus of opinion.

Causes may be classified under three main heads, namely: anatomical, systemic and bacteriological. It may be of interest to see what different writers have to say relative to these causes, and to draw our own conclusions. I shall try to avoid quoting at length.

Ballenger, after mentioning the effects of local conditions, anatomical and otherwise, and referring to such general conditions as heart lesions and circulatory disturbances resulting in a pressure necrosis, speaks of the effects of preexisting inflammation of the sinuses, and after quoting his authorities he states that his own experience is in accord with those who hold that "all, or nearly all cases of atrophic rhinitis are due to the suppuration of the accessory sinuses of the nose, more especially the ethmoidal and sphenoidal." And he adds: "I have seen many cases cured or greatly relieved by attention to the accessory sinuses."

Wright and Smith's text-book, on the other hand, says: "Most modern observers who have devoted attention to the histology of the lesions of atrophic rhinitis, believe it is primarily a bone disease." As to the sinuses, it says: "There is an affiliation of atrophic rhinitis with accessory sinus disease by virtue of the fact that the process itself occasionally extends to the mucosa of these sinuses."

Ball goes into the various causes, quoting freely, and ends up with this rather indefinite summary: "Whether atrophic rhinitis begins in the mucous membrane or in the bone, or whether it proceeds simultaneously in both, is not certain."

Zaufall maintains that the diminutive size of the spongy bones is due to an arrest of development and that the abnormal width of the cavities resulting therefrom conduces to retain the secretions which easily become dry and decompose.

It was Grunwald who claimed that the pus always proceeds from one or more of the accessory sinuses, thus denying the existence of ozena as an independent disease.

Coakley, after citing several theories, simply says that the cause is unknown.

Waggett, of London, says: "From a practical point of view it should certainly be regarded as a communicable disease and it will not be surprising if future investigations prove that the etiology lies in the communication of a septic mucopurulent catarrh to a nose of a particular anatomical type."

Gleason says: "Atrophic rhinitis is usually the result of long continued hypertrophic rhinitis.

Boswerth stated that in many cases the disease begins in childhood as a purulent rhinitis.

Habermann extending observations by B. Frankel and Krause regards ozena as due to a fatty degeneration of the acinous glands and Bowman's glands with inflammation and fibroid degeneration of the mucous membrane resulting in atrophy.

P. Watson Williams thinks the affection is of the nature of a trophoneurosis, which like acne vulgaris, is generally connected in some obscure manner with sexual development, or sexual involution at the time of the menopause.

Packard after mentioning the several causes to which we have referred, says: "There is no doubt that atrophic rhinitis may at one time or another result from any if not all of these causes."

Gradle says: "Infection by some specific form of microbe is the most plausible explanation of the peculiarities of this disease." And he also says, "coexisting inflammation of the different sinuses may, however, be a secondary or mixed infection with other pyogenic microorganisms."

Lockard, in his book on "Tuberculosis of the Nose and Throat," considers tuberculosis as an undoubted predisposing cause of ozena.

Grayson deprecates the multiplicity of theories, and thinks any one of them inadequate. He lays stress on the influence of hygienic conditions which are unfavorable, not considering them by any means the sole cause, but looking upon them as an important etiological factor.

Caboche attempts to demonstrate the tuberculous nature of ozena. His conclusion is that atrophic rhinitis may be only a larval form of tuberculosis.

F. Perez thinks ozena is a specific and contagious rhinosinusitis and that every case is derived from another human being or from

a dog. In support of his proposition he reports investigation of 413 cases which he divides into four classes: 1. Cases of contagion in the family, 93. 2. Cases of human contagion outside of the family, 35. 3. Cases of probable dog contagion, 16. 4. Undetermined, 36.

In the September number of *The Laryngoscope* there is a very interesting article on "Ozena among the various Races of the Earth." I am not supposed to be reviewing articles, but as this one throws considerable light on the subject under discussion, I may be pardoned for giving it some consideration. Doctor Roy of Montreal says that through extensive travels he has had opportunity to study ozena in the principal peoples of the globe, and to observe on the spot anatomical, physiological and pathological conditions. He makes three main divisions, white, black and yellow. His first important observation is that the continent of Africa is absolutely free from ozena, while negroes of pure breed as well as Mulattoes, in both continents of America, are subject to this disease; though they are not as susceptible as the white and yellow races. He comments to the effect that their mucous membranes in general are very resistant to infection, and it requires a prolonged contact with very virulent microbes to cause the disease. He says that the yellow races are very susceptible to this disease, but the frequency of it varies according to certain conditions. Climate he eliminates as a factor. He agrees with Boswerth that a prehypertropic condition is not an influence. Of our Indians he says: "In none of the cases does the enlargement of the inferior turbinal seem to have any influence on ozena, the frequency of which varies according to the more or less contaminated surroundings." He mentions also the frequency with which he observed deviation of the septum in the yellow race. In commenting on Zaufal's anatomical theory, he says that it is not borne out by his observation. To state his conclusions along this line briefly: He points out that the Mongolians with their deflected septums and restricted breathing spaces are more subject to this disease than the negroes with their wide nostrils and broad, flat noses. His final conclusion is that all races are subject to this disease, and that it is an infectious disease. Yellow, white and black, is the order according to susceptibility.

For some time much work has been done on the bacteriology of ozena, and through the kindness of Parke, Davis & Company I have been able to get some literature on the subject which has simplified matters for me.

Abel suggested that ozena was due to a bacillus called by him "bacillus mucosus ozenae." This organism was recognized by him to be identical with Lowenberg's bacillus and closely related to the pneumobacillus of Friedlander. Abel's bacillus is found more con-

sistently in ozena than any other and it is markedly absent in other infections of the nose.

Statistics are rather boring and I do not deem it advisable to quote them in detail or at any length. Suffice it to say that the Lowenberg-Abel bacillus is found to predominate and that it is seldom found in healthy nasal mucosa. But Perez bacillus has also been found in an important number of cases and is not found in normal cases or in other infections. In Parke, Davis' observations of 185 cases they have considered Friedlander's bacillus and Abel's bacillus as identical, stating that this bacillus has fulfilled the first of Koch's postulates as being the cause of atrophic rhinitis. This bacillus possesses a capsule which is a protection against the local disinfectants that are applied.

The diphtheroid group appeared almost as often as Abel's, but this is unimportant because it appears just as often in normal cases and in other infections. The Perez bacillus and the proteus group are next in importance to Abel's because they alone are capable of reproducing the ozena odor in cultures. This bacillus also fulfills the first of Koch's laws as an etiological factor.

As to vaccine treatment, they claim that a mixed vaccine is at present the most practical method of treatment now available, stating that the preparation of autogenous vaccines in every case is very difficult, if not impossible. They say that some well defined cases of ozena show prompt improvement under treatment with the vaccine and continue to do so until they make a complete recovery. The technic is that applied to other bacterial vaccines. At first 0.1 c.c. is given subcutaneously every three to five days. The dose should be gradually increased to 0.3 c.c. providing there are no contraindications. Marked reaction, either local or general, should be considered as a contraindication. From their own statements it is readily gathered that this treatment is in its experimental stage, and at best requires careful investigation as to the needs of each case together with considerable patience on the part of the patient and the physician.

I have no desire to make this paper exhaustive, covering the entire field, therefore the following will be our conclusion in the matter:

As to etiology, we must feed that evidence is strongly in favor of the germ theory, that is of infection by a specific microbe. But secondary causes and susceptibility must not be overlooked. That sex is a factor cannot be denied. Doubtless all of us will recall a predominance of females in our ozena cases. The general condition and hygienic surroundings of our patients is of no little importance. Heredity does seem to play an important part, but whether there is a tubercular or luetic taint at the bottom of these infections is by no means a settled question. As to sinus disease as an etiological

factor, my personal opinion is that it could not be more than a contributing cause and is often a secondary condition. The anatomical theory does not appeal to me as a result of my personal experience, for I can recall as many or more cases in the narrow sharp type of noses as in the broad flat type. Also, I place very little importance in the statement that atrophic rhinitis is the result of long-standing hypertrophic rhinitis. Even if it be true that ozena is always preceded by hypertrophic rhinitis, I consider it insignificant. Hypertrophic rhinitis is quite a common condition, and it is probably true that its presence might render one more susceptible to infection, but I am of opinion that it is only in this way that it could be a factor. The same thing might be said of deflected septums as has been said of hypertrophic rhinitis. There are very few perfect septums and I cannot give any definite statistics as to the relative occurrence of deflected septums in ozena cases and other conditions, yet I can but feel that a deflected septum has an important bearing, at least in a secondary way. It is hard to realize why all this cloud of doubt and difference of opinion should shroud this subject. But we probably all have a tendency to exaggerate our own pet theory to the overshadowing of everything else. We must not overlook the fact that all the theories have a probable bearing on the case and while not the chief cause their advocates would make them, at least they may be causative factors. It appears that the cloud is lifting and that our views are approaching some unanimity.

This brings us to the subject of treatment, which without some convictions as to the etiology would be purely empirical and unfortunately must be still somewhat so as there is no specific even in the direction of vaccine therapy. Each case must be considered on its own merits and contributing causes must not be lost sight of. Vaccine therapy has the lead at the present time and I presume that we have all given it more or less extensive trial. I cannot say so far that I am unduly enthusiastic with results. I have used both the vaccine composed of Abel's bacillus and the combined vaccine as well as the autogenous vaccine. The cases have been unquestionably benefited both as to reduction in the amount of crusting and as to reduction in the disagreeable odor, but much patience and time have been required and I cannot report a positive cure. Two or three years ago I was using a dionin spray and became quite enthusiastic as to results, but these results did not seem lasting. Scarlet ointment also had its day. I have gotten the best uniform results in cases where I have done a submucous resection of the nasal septum, in cases in which such an operation was at all indicated. I have seen comparatively recently cases on which I operated several years ago where the improved condition has been lasting and virtually amounted to a cure. Dr. Ferguson of New

York wrote an article on the submucous resection in atrophic rhinitis about a year ago and I was impressed with the similarity of his experience with mine. It may be that the correction of the mechanical obstruction and the removal of the irregularities has a beneficial effect, or it may be that some trophic changes take place following the operation which may stimulate the glandular secretion, but I have not failed to find the operation beneficial. The general condition of the patient should not be overlooked and local care should not be discontinued. Of course, I need not review these local measures. Whether the vaccine treatment is persisted in or not I would correct every septum that needed it in these cases. And furthermore, I do not consider ozena a contraindication of any required nasal pharyngeal operation. I believe cases in which I have removed large tonsils and adenoids have been benefited as to their ozena by the operative procedure.

MEDICAL ASEPSIS.

By EDWARD K. ARMSTRONG, M.D., Chicago.

In the hospital care of the communicable diseases the prevention of crossed infections is second only in importance to the medical care of the sick patient, the danger of the contraction of a secondary communicable disease always having been one of the serious objections to hospitalization. Approximately 75 percent of patients occupying beds in civil communicable disease hospitals are under 10 years of age, and 50 percent under 5 years, a considerable proportion of these being susceptible to measles and chickenpox and a certain number contracting diphtheria when exposed. Investigation of the past history of 524 normal children between the ages of 5 and 10 years inclusive, showed that 21 percent had not had measles, 62 percent had not had chickenpox, 51 percent had not had whooping cough, 91½ percent had not had diphtheria and 86½ percent had not had scarlet fever. The susceptibility to measles and chickenpox is so general at any age, beyond the first year, that it is reasonable to suppose that the great majority of children who have not suffered from an attack of these diseases will succumb when exposed. Such an inference regarding scarlet fever and diphtheria is not justified, however, no one knowing what proportion of the child population is susceptible to scarlet fever. Immunity to that disease increases, apparently, with each year beyond the seventh or eighth. As for diphtheria, Zingher showed that susceptibility to this disease is present in from 17 to 32 percent of normal children between the ages of two and sixteen years, while a slightly larger number of children suffering from measles, twice as many suffering from scarlet fever and three times as many suffering from poliomyelitis are capable of contracting the disease when exposed.

In our experience the greatest number of crossed infections occurred in those ill with or convalescing from scarlet fever, the next greatest number in recovering diphtheria cases. Children recovering from measles were comparatively free from secondary infections, though occasionally isolated instances of scarlet fever or diphtheria and, rarely, small epidemics of the latter occurred in the measles wards. Poliomyelitis is notable because of its freedom from trouble of this nature, but one instance of secondary infection occurring among 500 cases cared for over a period of 16 months. Nor have we ever seen poliomyelitis occur as a crossed infection in hospitals for children or among attendants caring for the disease.

The greater frequency of crossed infections among scarlet fever

convalescents in large measure depends upon the relatively long period that sufferers from this disease are isolated, in some states a minimum period of five weeks from the onset. The same conditions prevail in diphtheria when persistence of bacilli in the throat is followed by a more or less prolonged course of hospital residence, during which time exposure to other communicable conditions may occur.

Another factor influencing this distribution is the unequal length of the period of incubation of the various communicable diseases. The child exposed to both scarlet fever and measles or chickenpox almost invariably develops scarlet fever first, so that if hospitalized soon after the onset of the latter disease, the second infection does not evidence itself until after admission to the hospital, often after several days. Before the newly developing condition is recognized, others are usually exposed. Generally speaking, the frequency with which a patient suffering from one disease is found, after admission, to have been in the period of incubation of another disease, varies in inverse ratio to the length of the incubation of the first developing disease.

The diseases which are most common as crossed infections are, first, measles, then chickenpox, diphtheria, scarlet fever, German measles, whooping cough, and mumps. This seems to be about the relative order of most common frequency, though there is no fixed rule in this respect, often more trouble being experienced with chickenpox than with measles, and occasionally rubella becoming relatively more common. Of a series of 4,874 cases of communicable diseases, excluding erysipelas and poliomyelitis, crossed infections developed with the following frequency:

Total crossed infections.....	280 or 5.74 percent
Measles	132 or 2.70 percent
Chickenpox	120 or 2.46 percent
Diphtheria	17 or 0.34 percent
Scarlet fever.....	9 or 0.18 percent
German measles.....	5 or 0.10 percent
Mumps	6 or 0.12 percent

The most serious crossed infection is probably scarlet fever, the death rate from this disease in northern cities of the United States ranging from 2 to 8 percent or even higher during different years, no specific treatment being known. Diphtheria, too, is serious, though when occurring in a hospital where immediate specific curative treatment may be instituted, it is of less import. A series of approximately 100 cases of all three common forms, pharyngeal, nasal and laryngeal, developing as a crossed infection after admission, recovered without a death. Place reports 431 cases occurring in the Boston City Hospital with 100 percent of recoveries. If laryngeal in character, however, its occurrence under any circum-

stances is a grave complication. The appearance of measles is not to be looked upon with equanimity because of the frequency of respiratory complications and because of the fact that the previous infection usually leaves the child poorly equipped to withstand the disease. Chickenpox and German measles are of little importance from the standpoint of prognosis, seeming to have but slight effect on the ultimate well-being of the child, though occasionally fatal cases of both are seen. Whooping cough is a highly undesirable development, both because of the long and distressing course of the disease and the high mortality attending its occurrence in very young children. The use of a vaccine has apparently mitigated its severity somewhat and fortunately it does not occur with great frequency as a crossed infection. Mumps is unusual, too, and of comparatively little importance.

Infection among attendants belongs in the same category as crossed infection among patients. The element of personal prophylaxis is more important, however, in the former than in the latter, in fact the observation of the rules of personal hygiene or the lack of it are in great measure responsible for the frequency with which such infections develop in those susceptible, though housing conditions and overwork apparently have an important bearing upon their occurrence, as recently mentioned by Cushing and Murphy and by Neff. Whether this increased frequency of infection, if it does exist, is due to increased susceptibility or is the result of a letting down of individual prophylaxis, remains to be seen. If it is due to the former it must be accompanied, in diphtheria at least, by a decrease of the amount of antitoxin in the blood, and this in turn, should be demonstrable by the Schick reaction.

Incidentally it might be mentioned that scarlet fever and diphtheria rarely develop in nurses after their first ten days on duty among that class of cases. If this period is passed without either of the diseases being contracted, attendants are regarded as having developed a relative immunity. It is a wise precaution not to permit nurses new in communicable disease wards to work among the very sick for the first two or three weeks of their service. Under any circumstances it is also prudent to make use of the face mask as advised by Weaver. It is of interest to note that in the Cook County Hospital the largest number of cases of scarlet fever and diphtheria in employees occur, not among those working in the communicable disease wards, but in the general and children's hospitals.

The question of the proper prophylactic care of attendants would seem to be approaching solution. Cushing and Murphy state, and we agree with them, that they have always regarded the discomfort and disability attendant upon the use of prophylactic injections of serum as outweighing the benefits to be derived from the resulting brief immunity. Weaver, however, gives every nurse in the Durand

Hospital, who shows a positive Schick reaction, 1000 units of antitoxin. Every month they are retested and are immunized when a positive test reappears. Linenthal and Rubin report that the immunity conferred by 750 units of antitoxin lasted only four weeks in half the cases and in only six did it persist longer than five months. Under these circumstances it would seem that toxin-antitoxin administration should be of value. Park and Zingher have shown that 90 to 95 percent of individuals can be immunized by injections of a toxin-antitoxin mixture (from 85 to 90 percent of the L+ dose of toxin to each unit of antitoxin), the use of which is not followed by harmful after effects and which confers an active immunity lasting at least one and a half years. In view of the fact that only one-third of those injected are protected by the end of the third week, and from 15 to 25 percent not until the end of the eighth to twelfth week, it might be of advantage to combine active immunization by this method with the temporary immunization conferred by the use of prophylactic quantities of antitoxin subcutaneously, the duration of the latter being determined through retesting with the Schick reaction. Such preliminary immunization might well be made a requirement of pupils contemplating taking communicable disease training and indeed, in some hospitals it should be required of all susceptible members of the nursing staff.

Susceptibility to measles and chickenpox is so general that attendants who have not had these diseases usually promptly succumb when exposed, unless their training in medical asepsis has been thorough. On the other hand, the great frequency of these infections during childhood make their occurrence among adult contacts uncommon. Among attendants, diphtheria has been more than twice as common as scarlet fever and twenty times as frequent as measles, German measles or chickenpox, while scarlet fever was seen nine times as frequently as any one of the last three.

The manner in which measles, chickenpox, German measles, whooping cough and mumps, diseases characterized by a more or less lengthy period of incubation, gain entrance and a foothold as secondary infections in hospitals for communicable diseases is somewhat as follows: A child is exposed to and contracts measles, taking this disease as typical of the group, at the same time or within a few days of exposure to and infection with scarlet fever. The latter disease, because of its relatively short period of incubation, develops from one to six or seven days later, usually two or three, and the child is hospitalized, suffering only from scarlet fever, but being in the incubation period of measles. From one to ten days later, depending on the date of exposure, measles develops. If no precautions are observed, children in the immediate vicinity are exposed, and if susceptible, are almost sure to contract the disease. Ten days later they evidence the first symptoms of measles

and in turn expose all those close by, usually a different group of susceptibles. Thus infection spreads, unless steps are taken to curtail it, until the available material is exhausted.

The sources of infection with diphtheria are numerous. Even though the throats of all patients are conscientiously cultured, errors will creep in, either of technic or otherwise. The Klebs-Loeffler bacillus is not infrequently harbored in the nose, often as part of an active process with but few symptoms to call attention to its presence. Satisfactory nose cultures are not always easy to obtain, and if done in a superficial manner, as is often the case, a potent source of infection is bound to be overlooked. Furthermore, attendants coming into contact with the outside world and possibly with a relatively large number of patients, may become carriers and distribute organisms to all with whom they associate.

Scarlet fever occurs most frequently among those convalescing from diphtheria and in those sent in to scarlet fever hospitals with a mistaken diagnosis. Many such have been regarded as instances of second attacks of the disease.

That the spread of infection is the result, in all probability, of direct or mediate contact, providing the latter is not too long delayed, there seems to be little doubt. Chapin has shown, in his review of the arguments for and against contact and fomites infection and aerial transmission of disease, that only a few instances of infection with the communicable diseases are traceable to fomites infection, and there is no good clinical evidence that the common diseases are air borne. On the other hand, the great predominance of testimony is all in favor of contact as responsible for most if not all of the secondary infections which occur in hospitals for communicable diseases. A single exception to the latter statement need be made, that there is danger, as Weaver has again recently emphasized, in the transference of infectious material for short distances through the air by coughing or sneezing, a danger which particularly threatens attendants rather than patients.

The most potent argument in favor of contact as almost the sole method by which even the most easily communicable diseases are transmitted, is the experience of certain hospitals in their control. Particularly the Pasteur Hospital in Paris, the London Fever Hospital, the Monsall Hospital in Manchester, and, in this country, the Providence City Hospital, the University Hospital, Ann Arbor, the New London Memorial Hospital and the Durand Hospital, Chicago, have shown the results which may be attained by attention to the principles of medical asepsis.

The percentage of infections developing in the Pasteur Hospital has been less than 0.3 percent; in Rundle and Burton's experience the percentage was about 0.3; the Providence City Hospital cared for 1020 cases during 1915 with 47 secondary infections developing,

a percentage of 4.6; among 223 cases Cowie reports only 5 instances of cross infection; the New London Hospital reports only one cross infection during two years' experience.

Most English observers are inclined to believe that measles and chickenpox are air borne, to some extent at least, but Richardson of Providence, Romer of Cologne, Grancher of Paris, Rundle and Burton and others hold contact infection responsible for its spread. In our experience the development of crossed infections in communicable disease hospitals has never seemed to depend upon aerial convection, although every facility for that form of transmission was present, but rather were they easily traceable to contact infection.

The details of the method by which the spread of communicable diseases is prevented varies with each hospital. Not only does the construction of the hospitals differ, but the methods used to mark off the individual cases and the rules laid down to govern their management vary in each institution. In some hospitals open wards are utilized, the beds being separated by wire screens, low glass partitions, cloth screens, or only by tape stretched between them. In others separate rooms with partitions extending to the ceiling or with low partitions not preventing free circulation of air from room to room are provided. Certain private institutions build separate suites for single patients, each with its own entrance, thus effectually preventing transference of infection, but at the cost of a prohibitive overhead. In still others separate buildings for various diseases and combinations of diseases are used in the attempt to control crossed infections.

While proper hospital construction facilitates in great measure the observance of the rules essential to the prevention of secondary infections in the communicable diseases, yet the most painstaking architectural arrangement consistent with a reasonable cost of operation avails nothing if the essentials of medical asepsis are not observed. The avoidance of contact infection will keep the percentage of crossed infections down to the minimum in the most poorly arranged wards, but elaborate arrangements of private rooms will prove a failure if the methods by which infection is spread are not understood.

Though a discussion of the proper construction of a communicable disease hospital is not within the province of this article, yet the most important features may be briefly enumerated. A sufficient number of observation rooms of one to three bed capacity should be provided, the beds not to be closer than six feet; there should be a sufficiency of washing facilities in order that the hands of the attendants may be washed after leaving the bedside of each patient; the larger convalescent wards should not contain more than six or eight beds at the most, each ward to have its own toilet facilities,

though large bathrooms between each two wards are permissible; common dining and play rooms should be frowned upon; overcrowding should not be permitted at any time; the arrangement of supply rooms, diet kitchens and other service rooms should be such that a minimum of time and effort need be expended by the nursing staff.

The principles of medical asepsis are simple. They are based upon the belief that communicable disease infection is incurred practically only through contact, and that in order to prevent the transference of infection from one to another it is only necessary to prevent contact, either direct or indirect. There are three principle ways in which contact infection occurs: (1) directly, through physical contact of the sick with the well; (2) by indirect contact (which must be recent) through the medium of fomites, such as contaminated toys, towels, thermometers, dishes, and other articles which may become infected with saliva or other secretions; (3) by indirect contact through the medium of attendants, whose hands or clothing, infected by contact with the sick, carry the virus to the well. This is the most important of the three. Anyone who has observed nurses or physicians untrained in the principles of medical asepsis pass in quick succession from patient to patient with a fine disregard of the amenities of communicable disease nursing, cannot but appreciate the importance of such indirect contact.

Transmission of infection through either physical contiguity or fomites is comparatively easy of prevention and with those elements eliminated, the only remaining care is that all infection be left behind by attendants when they leave the bedside of the patient. The difficulty here lies in controlling the personal element. Any disease which is dependent for its spread upon inanimate objects or even upon living things other than man, is comparatively easy of control, as has been demonstrated in the case of typhoid fever and cholera, but if human activities are involved the problem immediately becomes more complicated and the situation less easy of control. Probably because of this fact, public health activities have not shown as good results as one might expect in the attempted control of diphtheria, scarlet fever and poliomyelitis.

Medical asepsis differs from surgical asepsis in that the latter aims to prevent access of any organisms, pathogenic or otherwise, but chiefly pus producers, to the field of operation; while in the former the intention is to prevent the transference of the virus of communicable conditions from patient to patient, disregarding organisms from a non-specific source. Surgical asepsis is comparatively easy of appreciation, as it involves strict cleanliness of everything which directly or indirectly comes into contact with the field of operation. Medical asepsis draws the line between the specific

contagious (so-called) affections and contamination with the ordinary germs of every-day life, the latter being disregarded.

The technic of medical asepsis in relation to communicable disease nursing has been given the most careful consideration by Chapin and Richardson of Providence, who, in their "Manual of Aseptic Technique," have formulated complete rules for the guidance of those caring for this class of cases. Their regulations apply in detail to the conditions met with in the Providence Hospital, but the principles on which they are based hold good the world over. Almost every act concerned in the care of patients is minutely described for the benefit of those engaged in the work, almost nothing being left to the imagination. While these rules find their most practical application in hospitals for the care of communicable diseases, yet the principles involved may well be recognized and practiced to a limited extent in general hospitals caring for children. Reduced to their lowest dimensions, the rules of aseptic nursing demand that the hands shall be washed after the performance of any act whatsoever, in the line of duty.

It has been found that the greatest difficulty in the practical application of these rules lies in the tendency of human nature to be slipshod, and the larger the nursing body, the greater the difficulties of training each individual. Preliminary drilling in the theory and practice of aseptic nursing over a period of a few weeks usually gives the best results. Following that the pupil is put to work in large units under the supervision of a more experienced worker, after which she graduates to the more exacting details of the smaller units. It has been found that pupil nurses are rather unsatisfactory in this work, the drawback being the necessity of frequent changes among the personnel of the staff inseparable from the use of pupil nurses. The very highest degree of efficiency is only reached when observance of the rules of medical asepsis becomes automatic, when washing the hands and slipping in and out of a gown are second nature. This pinnacle of efficiency is to be attained only by those long drilled in the work. Unfortunately even graduate nurses have their shortcomings. For the most part their training has been that of the general hospital, where attention to asepsis has been confined to the few weeks in the operating room. Their habit of thought, their viewpoint of nursing, insofar as the communicable diseases are concerned, are wrong, and it is not easy for the graduate nurse to disregard her previous training as completely as is necessary to quickly perfect herself in this technic.

Preliminary intensive training of prospective workers in this field, then, is highly desirable. The entire time should be given up to preparation, the course of instruction including three principle features: (1) Didactic work, comprising lectures in the communicable diseases, the theory of medical asepsis in its relation to nurs-

ing and an exposition of the rules as laid down for the hospital in question; (2) Demonstration work, which may be divided into three subdivisions, demonstration of the special technic of medical asepsis, using a model examining room, patient's room, section of ward, etc.; demonstration of particular features of communicable disease nursing in relation to the medical care of the patient; and lastly, demonstration of general nursing technic, sometimes necessary with graduate nurses in order to standardize the methods of procedure; (3) Written examinations in those portions of the technic of aseptic nursing which are not suitable for demonstration.

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CURRENT NOTES

THE GENERAL PROBLEM OF THE MINOR FORMS OF HEALING.*—This problem involves the licensure of members of healing professions, sometimes designated as the "medical cults" or "sects." It is in a large measure a legislative problem, for the State Legislatures are "makers" and "unmakers" of medical laws. These laws are the subject of bitter controversy in almost every session. The Ohio Eighty-second Assembly was no exception. These controversies rarely fail to bring to light certain weaknesses in medical practice acts and at the same time suggest certain remedies. Legislators fully understand the defects, but as yet do not generally comprehend the necessary remedies. I will discuss the Ohio situation, which I believe to be typical.

Ohio's Medical Practice Law, as enacted in 1896, legalized regulations for the practice of medicine or surgery and midwifery. It made no provision for the so-called "cults" or "sects." The first exception to the original requirements came in 1900 when the statute was amended for the benefit of Osteopaths and again in 1902. Some years later it was amended for the benefit of the dentists who desired to administer anesthetics generally and again not long after for the benefit of nurses. In 1915 a tremendous assault was made upon the Act. It resulted in numerous amendments providing exemption and modifications in favor of "cults" and "sects" and placed them all under the regulation of the Medical Board. Approximately twenty different forms of healing are specified in the law, but the Board was also given authority to examine and register persons desiring to practice any other limited branch or branches of medicine or surgery "that may now or hereafter exist." In other words, Ohio police power has been delegated to the State Medical Board to regulate the practice of all the minor forms of healing and the practice of nursing.

Bitter attacks were made on the Medical Practice Act in the Eighty-second Ohio Assembly. Optometrists, Chiropractors and Naturopaths each demanded the delegation of State police power to a board representing them instead of the medical profession, and through which they planned to control their own licensure. Christian Scientists demanded complete exemption. Osteopaths demanded the right to use drugs, to enter the field of major surgery and to be placed on a legal par with "other physicians and surgeons." Actively opposed to all of these measures appeared the State Medical Board with a membership representing the Regular profession, Homeopaths and Eclectics, ably supported by the well organized State Medical Association. It was profession against professions.

There appeared to be a pronounced "legislative state of mind" toward medical license, medical practice and the medical profession which was difficult to overcome and which was a bar to the consideration of these proposed measures entirely on their merits, particularly those which aimed to create new boards of regulation. It may be summed up in these words: "The Ohio Medical Practice Act is antiquated. It represents only three schools of practice. Such a basis of representation is also antiquated because it results in a sectarian board. If it is right to delegate police power to the medical profession, why not delegate it to the limited practitioners? There is a commercial aspect to this medical practice business. The State cannot legally prove the practice

*Address by Howell Wright, Secretary, Cleveland Hospital Council, Member of the Ohio Senate, at the Annual Congress on Medical Education and Licensure, Chicago, Ill., February 4, 1918.

of medicine unless it proves the giving of a fee. The medical profession apparently does not want other healers to practice for compensation. The Medical profession now regulates not only itself but also its competitors, the "limited practitioners." It seeks thus to control all potential competitors. We cannot distinguish between the State Medical Board, as now constituted, and the State Medical Association. Much opposition to these bills is based not on a desire to safeguard the public health, but to protect "special privileges." These arguments were often heard throughout the session and seem to indicate a deep-seated and far-reaching public distrust of the Medical profession. Far more than ever before the Legislator reflects the sentiment of his constituents.

Other schools of practice—the "medical cults" and "sects"—seem to have learned something of legislative procedure in recent years and skillfully played these arguments. For a time it seemed as if this type of reasoning would prevail regardless of resulting new licensing machinery and the number of ignorant practitioners turned loose upon the public by "exemption."

There were several combinations of political organizations regardless of party affiliations; numerous petitions urging the enactment of these measures and signed by "our constituents," daily made their appearance. And it is interesting to note that some of these petitions contained the signatures of practicing physicians and dentists. All of this indicates that the problem under discussion is one essentially of education—education of the Legislature—education of the public—as well as education of the limited practitioners and the medical profession itself, to harmony in one ideal—that is—Public Health and Welfare. Let us analyze these legislative proposals more in detail for proof of the general need of education.

Optometry.—Aside from the demand for a new licensing board, this bill was designed to license men and women to practice optometry, which was defined to be "the employment of any means or method other than the use of drugs for the measurement of the powers of vision and the adaption of lenses for the aid thereof." Attempts were made by Optometrists to entangle the Senate in a discussion of the relative value of this method of drugless treatment, but were unsuccessful. It contained the usual exemption clause for all persons who had practiced for five years and for applicants after November 1, 1917, the preliminary education requirement was fixed at two years of high school. Graduation from a reputable school of Optometry, maintaining a two-year course, was demanded, and, of course, the new board was to determine the meaning of the word "reputable." Even this brief analysis indicates the need of education.

The leading Optometrists of Ohio were, and still are, fully aware of this need and understood the danger of admitting to practice, under an exemption clause, the great horde of spectacle vendors and other persons claiming to be Optometrists of five or more years of experience. But for an injunction against the Medical Board in the name of the Optometry chief lobbyist, many well qualified Optometrists would long ago have been licensed by the Medical Board. This and the antipathy of the Legislature toward new boards, defeated the Optometry bill.

Chiropractic.—Chiropractors, hundreds of whom had been already licensed to practice under the 1915 exemption clause, also demanded their own licensing board. Educational qualifications were to be of the flimsiest character. Under this bill, if enacted, "Every person licensed . . . was to be entitled to all the privileges of the diploma granted to him by the school or college from which he graduated." What should one say to this when he knows that there is not a single chiropractic school in the United States of high enough standing for recognition by the Ohio Board? Obviously, as a matter of justice, he should emphasize the need of more education.

Naturopaths.—Naturopaths also demanded a special licensing board for the regulation of all limited practitioners. They sought special police power privileges for all the minor forms of healing. It was such a freak bill that it never appeared outside of committee.

Osteopathy.—The Osteopathic Bill, which was intended to secure legislative recognition of osteopaths on a legal par with other physicians, as finally enacted, corrected a great injustice—first to the sick public and then to those who practice osteopathy. Up to this time Ohio Osteopaths had been allowed to practice obstetrics and minor surgery, but were not allowed to use antiseptics or anesthetics. The danger of this inconsistent regulation was eliminated by an amendment which also prohibited them from performing major surgery, and which included a definition of major surgery. The bill, so far as it relates to anesthetics, was opposed by the anesthetists' organization on the ground that "it is a menace to constituent members of the Ohio State Medical Association who are entitled to protection." During the hearing the proponents of the bill attempted to prove that the curricula of the leading osteopathic schools contain requirements similar to those of the best medical schools. This recognition of the importance and need of special education of those who desire to treat the sick is hopeful and significant.

Christian Science.—Christian Scientists demanded exemption on the ground that Christian Science is not the practice of medicine, but the practice of religion. The bill passed the Senate but was overwhelmingly defeated in the House through the efforts of the organized medical profession with the assistance of organized religion. It was defeated as a menace to public health. It was argued that Christian Scientists should not be allowed to take a compensation for their services. Yet it was clearly shown that Christian Scientists practice as they please in the cities of Ohio and flourish financially because the Medical Board can rarely detect them in the process of accepting compensation or contributions. Again the need of education is emphasized. How much more will be needed to completely establish the fact that any such commercial basis for protection of public health is futile?

Conclusions.—Some definite conclusions can be drawn from these legislative controversies. Although the medical profession is, as a rule, bitter in its condemnation of politicians and defines them in terms broad enough to include all members of legislatures, I will state some of my own conclusions without apologies. They are based upon my experience as a member of the Ohio Senate in which I served as Chairman of the Public Health Committee, and upon information gained by contact and correspondence with public health officials of other states.

1. Education is the fundamental basis for licensure of the limited or unlimited practice of medicine. With few exceptions the present system and laws pertaining to medical licensure places too little emphasis upon education. Our medical laws are "prohibitive" rather than based essentially on "educative" standards. A great majority of the ninety-three separate and independent boards in the fifty states, having to do with the licensing of those who seek to practice the healing art, are not educational boards but political-medical boards. An examination of medical practice acts indicates that in a majority, including Ohio, the legal, fundamental basis of medical practice is commercial. In any criminal procedure aimed to protect the public from ignorant practitioners the question to be proved should be "What are the man's educational qualifications for the work in question?" and not "Did he get a fee?" The fact that this use of the police power of the State was delegated primarily to detect and prosecute quacks does not justify the emphasis of the commercial factor of medical practice over and above the "educative."

2. It is fundamentally wrong to lodge the police power of the State in the

hands of representatives of any profession to prescribe within legislative limits the educational qualifications of that profession; to govern its license and to regulate its practice. It was undoubtedly necessary for the Medical profession to take the lead in advocating our present licensing system and medical laws. Probably no other group could have undertaken such leadership. It should, however, no longer have to fight each year in the Legislature as the guardian of the public interests in opposition to other healing professions. It can well continue to advocate higher educational qualifications for the degree of Doctor of Medicine and for the license to practice. It has no reason to fear serious competition from other healers. If it continues to render effective service, the public will demand that service.

3. The general educational board or a department of education and registration should gradually supersede the present system of politico-medical licensing boards. Ohio is undoubtedly ready to consider one of these plans. In general, if the board plan is adopted, no healing profession to be regulated by the board should be represented on it. The advice and assistance of representatives of the various healing professions can be secured in technical and professional matters, but final authority—subject of course to the Legislature—over all that pertains to the examining and licensing of these professions must rest in the hands of the board, or like the Illinois plan of a department headed by a well qualified lay-educator. The States must soon choose between further extension and multiplication of the modern "gild controlled" licensing system and the single licensing educational board or department.

4. There should be more systematic state control and regulation of educational institutions existing for the purpose of granting professional degrees. The present loose system in some states makes the problem of inspection and recognition of certain schools by the licensing authorities almost impossible and is a decided bar to the enactment of modern legislation.

5. Uniform educational standards should be applied to the "medical cults" or "sects." If the minor forms of healing, including optometry, osteopathy, chiropractice, etc., are the practice of medicine or the healing art in the sense that "the practice of medicine means the science of preserving the health and treating diseases for the purpose of cure, whether such treatment involves the use of medicinal substances or not," then the same educational standards must be applied to them as to the Doctor of Medicine. If not, they should be regulated as "limited practitioners" and their educational qualifications gradually raised to standards corresponding to their work.

6. There seems to be numerous reasons why those who seek to prevent or cure disease by spiritual means or prayer, in obedience to the tenets of a recognized church, should be exempt from the application of the educational standards. The contagious disease problem, however, presents the element of doubt. Prominent members of your Association, including your very distinguished Dr. David Strickler, whose writings are a source of inspiration and education, and which should be placed in the hands of every legislator in every State, have urged this exemption. Christian Scientists, the most prominent of the spiritual healers, are now exempted in some thirty states on religious grounds, subject to certain safeguards. There is, however, no reason for any exemption from any general law pertaining to public health or welfare. Information obtained from officials in a majority of these states furnishes proof that they are reasonably considerate of the public health in reporting contagious diseases. Christian Science is either the practice of religion or the practice of medicine—if the former, its practice should not be subject to medical practice laws. This whole question seems to be not only one of legal interpretation, but a matter of understanding and adjustment on the part of

members of the medical profession and on the part of Protestant denominations who have heretofore opposed the practice of Christian Science.

The controversy in the last Ohio Assembly over the Christian Science exemption, participated in by Protestant clergymen, was not consistent with the modern spirit of religious liberty. If people wish to employ them as practitioners of religion, it is not consistent with the best traditions and accomplishments of the medical profession to oppose such employment. The medical profession has nothing to fear from Christian Scientists.

In thus addressing you I have no desire to provoke controversy. I am strictly "regular" in my personal choice of professions. I recognize the great accomplishments of the medical profession. My experience as a hospital administrator fully confirmed my high estimate and regard. Nor do I wish to be considered as a "reformer," for I am advocating no propaganda whatever, unless it be to emphasize the need of more education and higher standards in all matters pertaining to medical license and practice. In what I have said I have endeavored to point out from the legislative point of view some of the defects in our present system and to suggest as a possible remedy, more education.

FLAT FOOT AND ITS TREATMENT.—One of the things that we have learned from the examination of men for the army, is that a large number of the young men of military age are handicapped because of flat foot. In civil life this is not always a serious matter, but a soldier is only as good as his feet, and therefore any deformity of the foot is of the greatest importance.

Of the white men who applied for enlistment in the United States army during the period from 1912 to 1915 inclusive, 55 out of every 1,000 were disqualified because of flat foot. Thirteen percent of the men examined by me since the outbreak of war were rejected for this reason. A much larger number of men had flat feet, for those with this deformity in moderate degree were passed. A large number of the men who were so passed, later appeared on the sick list, because the condition of their feet precluded their engaging in the strenuous exercise incident to the training of the soldier.

About 400 such men from various parts of the country were placed under treatment by Lieutenant H. B. Perry, Medical Officers' Reserve Corps, at Fort Ethan Allen, Vermont, and about 90 percent were returned to the ranks cured, or so relieved that they were able to continue their training without discomfort.

The following exercises for the treatment of flat foot are those that have been found adapted to conditions met with at an army post and are now in practice at Fort Ethan Allen, Vermont:

The feet and legs should be free. Shoes and stockings should be removed. Underdrawers and breeches should be loosened so as in no way to restrict or limit muscular action of the legs.

The toe exercises are the first ones taken up. The men stand on a raised platform—a two-inch plank is sufficient; they are then directed to flex the toes to the extreme point of flexion with a hard pull of the flexor muscles of the sole of the foot at the extreme point of flexion. This is followed by extension without effort. This exercise is repeated continuously from five to ten minutes, the shorter period at the beginning, gradually lengthening the time of this particular exercise until the full time is possible without fatigue. The second exercise is a continuation of this flexion of the toes on the sole of the foot, plus inversion of the foot to the extreme, bringing into the action the tibialis anticus muscle. At the extreme point of inversion, a strong hard pull is made, then the foot is allowed to resume its usual position without any muscular effort.

At the beginning fifteen or twenty minutes is sufficient for the entire routine of exercise. Later, after the muscles become stronger, a full half hour may be devoted to this without marked fatigue. The plan as outlined above should be carried out each morning under the supervision of a man trained along this line. The patients should be instructed to repeat this performance each night on retiring, devoting one-half the time consumed in the morning.

Many of the cases with marked eversion of the foot walk with the toes turned out. The men are instructed to walk with the toes turned in at all exercises and at all other times during the day. We believe that this latter advice relative to walking is vitally important in the general handling and treatment of these cases.

The plan of treatment here outlined is so simple and the results have been so good, that it would seem that it could be adopted with profit by the physical directors in our public schools and in gymnasiums. Without doubt such a plan of treatment will relieve many of the aches and pains from which people suffer, and save them from falling into the hands of charlatans who prescribe costly systems of treatment, without any knowledge of the cause of the trouble and without curing the condition.—Major Brewer, M.R.C., in *Health News*, December, 1917.

BOOK REVIEWS.

THE MEDICAL RECORD VISITING LIST OR PHYSICIANS' DIARY FOR 1918. Revised. New York: William Wood & Co.

This convenient visiting list appears in various styles adapted for the registration of professional visits for thirty, sixty, and ninety patients a week respectively.

THE BABY—BEFORE AND AFTER ARRIVAL. Intimate talks with prospective mothers in plain, nontechnical language. By Joseph Brown Cooke, M.D., formerly Adjunct Professor of Obstetrics in the New York Polyclinic Medical School and Hospital, etc. Illustrated. Philadelphia: J. B. Lippincott Company, \$1.

As well stated by the author, this is a book for the young woman who desires scientific helpful information of a sort different from that of a generation ago, when "every old granny, having had a few children herself and having seen a few other women in childbed and heard the fantastic tales of midwives, monthly nurses, and other equally-uninformed persons, felt that she knew more about the question in hand than the physician who had conducted many hundreds of cases, and studied many thousands with scientific diligence."

THE PRINCIPLES OF MENTAL HYGIENE. By William A. White, M.D. With an introduction by Smith Ely Jelliffe, M.D., Ph.D. New York: The Macmillan Company, 1917, \$2.

A splendid little book that should be studied by layman as well as physician. From the first to the last page the book is fascinating because of the enormous importance of the problem dealt with and because of the clear, direct, and convincing style of the author.

The book deals with society's attitude toward social inadequacy as manifested by the insane, the criminal, the feeble-minded, et al. It demonstrates convincingly how we sit in judgment with utilization of emotion rather than intellect, and offers a program for the betterment of existing conditions. The keen analysis of the problem and the rational plan for improvement makes one wish that the book could be read by everyone.

ELEMENTS OF HYGIENE AND PUBLIC HEALTH. A textbook for students and practitioners of medicine. By Charles Porter, M.D., B.Sc., M.R.C.P. (Edinburgh) of the Middle Temple, Barrister at Law. 411 pages, with 98 illustrations. Henry Frowde, Hodder and Stoughton, Oxford University Press, London, 1917. \$4.15.

This book is designed especially for students and general medical practitioners. Nothing essentially new is offered save the presentation of the subject matter. The book is the product of a careful evaluation of facts recorded in the literature, which have been thoroughly digested and presented in a logical and readable manner. It is gratifying to see so many new and original illustrations scattered throughout the text. The sections on Public Health and Diseases, Housing, and Removal and Disposal of Refuse and Waste are especially appealing and instructive. The compactness and logical arrangement, and disposition of subjects together with the well chosen illustrations should make this work a useful text book for courses in Hygiene and Preventive

Medicine. It should also be readily accessible to the busy medical practitioner, who occupies a unique position in relation to the problems involved in the conservation of the public health and the prevention of disease.

AVIATION ENGINES—DESIGN, CONSTRUCTION, OPERATION, AND REPAIR. A complete, practical treatise outlining clearly the elements of internal combustion engineering, with special reference to the design, construction, operation, and repair of airplane power plants; also the auxiliary engine systems, such as lubrication, carburetion, ignition, and cooling. It includes complete instructions for engine repairing and systematic location of troubles, tool equipment, and use of tools, and also outlines the latest mechanical processes. By First Lieutenant Victor W. Page, A.S.S.C., U.S.R., Assistant Engineering Officer, Signal Corps Aviation School, Mineola, L. I. Contains valuable instructions for all aviation students, mechanics, squadron engineering officers and all interested in the construction and upkeep of airplane power plants. New York: The Norman W. Henley Publishing Company, 1918, \$3.

The rapidly increasing interest in the study of aviation, and especially of the highly developed internal combustion engines that make mechanical flight possible, has created a demand for a textbook suitable for schools and home study that will clearly and concisely explain the workings of the various aircraft engines of foreign and domestic manufacture. This volume is written by a recognized authority and must prove of value to anyone interested in the problem of aviation.

KIRKES' HANDBOOK OF PHYSIOLOGY. Revised and rewritten by Chas. W. Green, Professor of Physiology and Pharmacology, University of Missouri. 790 pages, with 509 illustrations. William Wood & Co., New York, 1917, \$3.75.

The ninth edition of Kirkes' Handbook may be classed as a work on General Physiology. The chapter on Nutrition has been revised to include the work of Osborne and Mendel on food factors necessary for growth, and of Funk, Voegtlin, and others on the vitamins and nutritional diseases. The chapters upon Blood, Circulation, and Digestion are well written: the chemical side of each receiving full consideration. The section dealing with internal secretions is meager and unsatisfactory. The chapter on the reproductive organs is little more than a summary of the anatomy of these organs. Special emphasis has been placed upon the selection and presentation of laboratory experiments. The author is prone to enter allied fields of science, as evidenced by the first 78 pages devoted to Cell Differentiation and the Typical Structures of the Elementary Tissues, followed by 35 pages in which the chemical nature of proteins, fats, and carbohydrates is considered. Many of the illustrations are well chosen and to the point; many are unnecessarily large, and a large number of the purely anatomical drawings might well have been omitted.

The general nature of the text and the lack of citations of original sources render it useless as a reference book. The text is written on broad lines and is complete in itself, including a laboratory guide. The book is intended for the use of medical students, hence it is hard to understand the emphasis placed upon the general macro- and microscopic anatomy and chemistry. For academic courses in physiology such a work is admirable, however the medical student has ordinarily safely passed the subjects of anatomy and chemistry before entering courses in physiology. The same criticism may well be applied to certain other texts of physiology at present on the market.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

APRIL, 1918.

No. 4

EDITORIAL.

THE TREATMENT OF PNEUMONIA WITH ANTIPNEUMOCOCCIC SERUM.

In the February Number of *The Military Surgeon*, is published an article entitled "An Epidemic of Measles and Pneumonia in the 31st Division, Camp Wheeler, Ga.," by Lieutenant-Colonel Louis C. Duncan of the Medical Corps, with an appendix by Major Joseph Sailer.

In ordinary circumstances this report would not call for comment in an editorial. It is admittedly incomplete and the conditions under which the epidemic was handled were apparently such as to render the statistical results of only relative value. There has, however, been shown a tendency in quarters which should be impartial to represent this report as unfavorable to the serum treatment of pneumonia. Though one may feel sure that the authors would be the last to claim the right to make an authoritative pronouncement on this therapeutic subject, one is obliged, for the reasons stated, to submit their results and their presentation of them to an analysis and to criticism.

In the first place the statistics are decidedly confusing. The total number of cases of pneumonia is stated with notable variability. Thus on page 127 we have two totals, 623 and 701; on page 130, two different totals of 684 and 614 respectively; on page 131 the figure becomes 642.

As explained in our editorial columns in February last, of the four types of pneumonia infections, only one is susceptible to serum treatment, namely Type I. On examining the figures—the very meager figures—for differentiation of types presented in Colonel Duncan's report and in the Appendix, we find a statement that the serum was employed in 40 cases in which type determina-

tion was possible, and that in these 40 cases the mortality was 10 percent, while the general mortality was 20 percent. Remember that all these 40 cases were of Type I, and that the usual mortality of Type I is in the neighborhood of 30 percent.

Carrying our analysis a little further we find that the number of Type III cases was negligible. There seem to have been—so far as we can judge from the scanty figures—about three times as many cases of types I and II together as of type IV. Once more let me remind my reader that types I and II have a high mortality and type IV has the lowest. Type III, which seems almost absent from this epidemic, is by far the most virulent of all.

Assuming that the epidemic, as a whole, exhibited the same distribution of types as shown by the relatively small number of differentiations reported and assuming, further, that the types had the ordinary mortality they show when no serum has been used, we should have a mortality not less than 21 percent and not greater than 28 percent. Our provisional assumption that the types exhibit their ordinary virulence is, therefore, fairly well supported by this analysis.

Taking these facts into consideration, it seems to me astonishing that anyone should use Colonel Duncan's figures as a basis for an attack on the serum treatment of pneumonia. If they mean anything at all they afford, so far as they go, strong confirmation of the claims made for the therapeutic value of type I antipneumococcic serum, for his determined cases show a mortality of only 10 percent.

I have said, "If they mean anything at all." In all this question of the pneumonia serum one must constantly bear in mind the fallacies due to defective immunologic technic or to the employment of inappropriate serum for differentiation. Everyone who is in contact with a serologic laboratory is aware that a great number of so-called differentiations are being made by inexperienced persons with serums which are not adapted for the purposes. This causes much confusion of issues. In the case we are considering the name of Zinsser, though not quoted in connection with laboratory work, affords security from this fallacy, and it is with more confidence, therefore, that one cites these figures, meager though they are.

I do not wish to be thought to be passing any unfavorable judgment on the report of Colonel Duncan which, when allowance is made for the great difficulties under which the epidemic was handled, constitutes a valuable addition to the literature of epidemiology. How great the difficulties were may be judged by a passage in which it is stated, "Owing to the deficiencies of the clinical laboratory it has not been possible to test for ketonuria." The test in question calls for a test tube and a little ferric chloride solution. A laboratory which did not possess even these simple materials

for clinical research was truly defective. Opinions expressed in the report and appendix will, it is safe to say, have much less weight than the figures on which they profess to be founded.

The value of the article is enhanced by the incorporation of a circular signed by Colonel Duncan and dealing with the prophylaxis of pneumonia in camps. As many of our readers will be in charge of such agglomerations of men, I make no apology for quoting this circular *in extenso*. The eighth clause of this circular is dictated, evidently, by the observation that the hosts of intestinal parasites are especially susceptible to pneumonia.

"PNEUMONIA.

"Pneumonia is an infectious disease, conveyed by means of saliva and mucus from the respiratory organs. The disease may be communicated directly by contact, indirectly by a carrier, or by dust containing the cocci. The following measures are to be carried out:

"1. The surgeon should see that all regulations for the ventilation of tents by keeping hoods and doors open are enforced.

"2. The floors must be scrubbed daily, with 2 percent creolin, or its equivalent, when possible. No dry sweeping should be allowed.

"3. Spit boxes must be kept in all tents, containing sand wet with creolin solution, and emptied daily. The company streets must also be kept clean.

"4. The tents must be furled on all clear days, and kept furled for not less than six hours.

"5. Not more than five men are allowed in a tent, and the heads of the men must be as far apart as possible, 5 feet being the minimum.

"6. The surgeon should keep a record of all cases of pneumonia and a plot showing the location by tents. Infected tents should be given special attention. Names of patients may be procured at the Division Surgeon's office.

"7. Bedding and clothing of measles and pneumonia patients will be disinfected as soon as disinfecting rooms are ready at the infirmaries. Beds should be sunned well.

"8. Chenopodium will be given all men who have not yet had it."

THE AUTHENTICITY OF SPECIMENS—A PLEA FOR RED TAPE.

Among the many fallacies which underlie a laboratory report none is more insidious than that which results from insufficiency or absence of precautions to ensure the authenticity of the sample submitted to examination.

Many years of experience as an analyst and twelve years as the head of an active medicolegal and toxicological service finished by accustoming me to what at first seemed the astounding indifference of the medical practitioner to this vital factor. Perhaps at the back of my mind lay the belief that the supposed fatalism of the Oriental was to blame—for my work lay chiefly among Orientals. But experience, as first and at second hand, in this country

has convinced me that this cheap explanation is inadequate and that the phenomenon is general.

It is certain that sufficient pains are not taken to impress upon students, internes, and nurses the necessity for taking stringent measures to ensure the authenticity of specimens. This is, perhaps, because their seniors themselves are insufficiently impressed with the importance of the matter. Yet one can figure the embarrassment of a surgeon who, having collected, for analysis, urine from the two ureters separately, removes on the strength of a laboratory report the wrong kidney, the specimens having been mislabeled.

It is certainly not because the seriousness of the results that may follow from carelessness in this matter is misunderstood that so much indifference is shown. To affirm that would be an insult to the intelligence of the physician. It must be because the ease with which mistakes can be made is insufficiently appreciated.

It is, of course, easiest for such an error to occur in the laboratory, but it is by no means a rarity for a confusion of specimens to take place before they reach the laboratory worker.

Let me draw an example from a different class of work, thereby lightening, perhaps, a dull subject. All are familiar with the principles if not with the methods of dactyloscopy (finger-print identification). It fell to my lot to inspect an identification bureau at the head of which was an elderly man somewhat "set in his ways." As is usual with such characters he was an expert in his particular line and resented outside suggestions. On the occasion of my first visit I noticed that the prints were being taken on blank forms, the names and other details being filled in later. In my report I recommended that the blanks should be filled out before the taking of the prints and that the operator should check their accuracy at the time of making the impressions. My suggestion was not acted on and, therefore, on my second visit, I caused a substitution of subjects to be made between the "printing" and the filling of the blanks. The result was comical, for the chief of the bureau having been invited to show me how he would search his files for the record of a previous conviction, the finger print was made to establish a thirty years' criminal record for a youth of eighteen. Results more tragic can easily occur from the unintentional confusion of two specimens for analysis. How may such mistakes be avoided? Only by appropriate *red tape*. Red tape is but another word for routine accuracy. It is abused by those who do not comprehend the necessity for it—just the class who do not understand how easily serious mistakes may occur. Red tape, like other healthy structures, is occasionally subject to hypertrophy and even to malignancy.

What particular measures in practice and in the wards should

be adopted is a question that cannot receive a general answer except in the terms *System* and *Vigilance*.

For the laboratory it is possible to be a little more definite. The principal rule to observe is not to unseal the original package, bottle, or other container and, above all, not to commence any operation on the sample until the names and other data in the container and on the requisition or other papers have been collated. It is also a good practice, before opening the specimen, to prepare any vessel or vessels to which portions may be transferred (e. g., a centrifuge tube) and to mark all with the same serial number and letter, in "grease pencil." Separation will not then cause confusion. It is well to start a new letter series each day. Thus A marks the first series of samples, B the second and so on. Thus a specimen marked 4 C, would be the fourth specimen of the third series of the day.

Whatever the method used nothing but strict system and constant vigilance will serve to prevent serious mistakes.

THE CONTROL OF COMMUNICABLE DISEASE.

In October, 1916, the American Public Health Association appointed a Committee on Standard Regulations. The report of this committee dealing with the control of communicable disease appeared in *Public Health Reports* for October 12, 1917, and is now issued as a reprint by the United States Public Health Service.¹ Thirty-eight diseases are dealt with. No accusation of vagueness can be brought against the report. On account of the precision of its language it may be taken as a point of departure from which to measure future epidemiologic advances.

The terminology is clearly defined in a glossary at the commencement. Some of the definitions are new, some selective. To the older school of hygienists the definitions and limitations will be particularly valuable.

For each disease the following headings are dealt with:

1. Infective agent.
2. Source of infection.
3. Mode of transmission.
4. Incubation period.
5. Period of communicability.
6. Methods of control.

(A) The infected individual and his environment:

1. Recognition of the disease.
2. Isolation.
3. Immunization.
4. Quarantine.

¹Reprint No. 436, The Control of Communicable Disease. Price, 5 cents a copy.

5. Concurrent disinfection.
6. Terminal disinfection.
- (B) General measures.
- (C) Epidemic measures (occasionally require separate mention).

With regard to venereal disease the need for coordinated measures for control is so urgent that on January 2, 1918, Surgeon-General Blue sent the following telegram to the health officers of all the States:

Control venereal infections in connection prosecution of the war constitutes most important sanitary problem now confronting public-health authorities of United States. Plan of control mailed you today. Request your cooperation forceful enforcement same. Venereal infections should be made reportable and quarantinable means of diagnosis and cure should be provided. Campaign wisely conducted publicity should be launched. Please inform me your action in premises.

BLUE,
Surgeon General United States Public Health Service.

This was followed by a letter expanding the thesis thus propounded and accompanied by a memorandum relative to the control of the venereal diseases, with present particular application to the military population.

These two documents, the report of the committee and the memorandum of Surgeon Blue should be kept for reference by all physicians, social workers and administrations.

ORIGINAL ARTICLES.

THE TREATMENT OF UNDESCENDED TESTICLE.

By JOHN R. CAULK, A.M., M.D., of the Editorial Staff, St. Louis.

On another page of this journal the author has abstracted the recent literature on the subject of "Undescended Testicle." It can be noticed that the most satisfactory operations have been those done according to the Bevan technic, with attempt to preserve the vessels of the cord. With this modification testicular atrophy has certainly been lessened, and the transposing results have in many instances been excellent. While in some cases it may be necessary to ligate the vessels to bring the testicle to the bottom of the scrotum, it has been my experience that the majority may be brought down completely without such ligation.

Since the beginning of the draft many men have applied for hernia repair and cure of undescended testicle, and I have had the opportunity of operating on some markedly retracted testes, and have been able by a simple method to bring them all to the bottom of the scrotum without ligating a single vessel. For this reason I wish to make a few suggestions which seem applicable in most instances of retained testis. I have been impressed with the fact that the vessels, owing to their tortuosity and elasticity, should not be so frequently incriminated for defective descent. This is practically the idea that Keyes has brought out in his technic. They should be spared if possible in order to protect the life and maintain the development of the testicle. I have found in quite a number of recent operations that the important fastening factor which prevents the testicle from being displaced downward has been the tautness of the fascias of the cord, so that, after the sac has been carefully freed and ligated according to the Bevan technic, I hold the testicle upward, pulling the cord taut and gradually swing it around a circle with its centre at the internal ring. As each taut band of fascia is seen it is nicked at the internal ring. A very small incision in this region will cause the testicle to drop surprisingly.

With this simple process I have been able to bring the testicle well down to the bottom of the scrotum, and in one instance a half inch below the scrotum, without cutting a single vessel. Should the vas be shortened, it can be lengthened by pulling it and separating it bluntly with the finger within the internal ring. In one case I

have been able to bring it an inch forward by stripping from within the internal ring. Another modification, which may not be necessary, but which has seemed to me advisable, has been the fastening of the fascias of the cord at different levels along the canal to the tissues around in order to hold it taut without playing on any one part. I have also sutured the testicle to the bottom of the scrotum. With this simple technic, I believe the majority of the testicles may be brought to the bottom of the scrotum, as I am convinced that the fascias are chiefly responsible for the shortening, and that the best place to nick the fascia is at the internal ring, from which they emerge.

THE IMPORTANCE OF THE WORKINGMAN'S HAND AND ITS TREATMENT WHEN INVOLVED IN SEPSIS.

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This paper is a plea for greater detail in the consideration and treatment of the septic hand. How many of us ever stop to consider the wonder of the human hand? In this era of rapid advance in the manufacture of most delicate instruments of precision, what wonderful mechanical device, what most delicate instrument, what part even of the human body is more wonderful in its delicate, intricate yet powerful construction than the human hand? The strength in its slender tendons, its powerful muscles, the multitudes of delicate movements possible, its flexibility, its adaptability and its acute sensibility are things of wonder and admiration.

And yet how quickly, how easily, how utterly is this beautiful piece of machinery ruined by the introduction of a few germs into its mechanism!

How necessary is it that we try to preserve this wonderful machine, so indispensable to all productive labor, to all economic advance, to all progress in science, and to the enjoyment as well as the maintenance of life itself! With full appreciation of the profound importance of the hand, Kanavel has placed before us his splendid treatise on the minute anatomy of the hand and its treatment when involved in sepsis.

For a considerable number of years we have been greatly interested in the treatment of septic hands, and before Kanavel's work appeared, we worked hard but perhaps not always entirely intelligently over these cases. But now, armed with the detailed anatomical knowledge of the ramifications of the various bursae and the routes of travel of infection through the many spaces of the hand we feel we should produce results far better than in the past.

Clinically these cases need intensive study and the greatest attention to the minutia of treatment to produce the best results. No part of his body is of greater importance to the artisan of any class than his hand. What can he do without it? Practically nothing! And he soon becomes a dependent on relatives or on the State and an economic loss in far greater measure than those suffering from almost any other disease or accident. We ask the question, "Does the septic hand get the painstaking, intelligent treatment that its economic value demands? We believe it does not, and

we think the study here presented will show a few reasons why this is so.

We have taken 77 consecutive cases, of such severity as to demand house treatment, and made from them a detailed clinical study, in order to bring out and emphasize points in the treatment of these cases which we believe are too often neglected and which we feel need further emphasis.

The problem presents the following phases:

1. Treatment of the patient from the point of view of general infection or its prevention.
2. The local treatment of the locally infected area.
3. The type of operation.
4. After treatment (kind of dressings), passive motion and massage, etc.
5. Plastic operations to overcome unavoidable deformities.

From this study we are able to produce figures to back up the contention that we have been trying to emphasize for several years, namely, that *every* case of infection of the hand should, when first seen, be treated in bed as a house case and never as an ambulatory case.

Let us follow a typical septic hand as seen in our outpatient departments. The hard working, poorly nourished, probably alcoholic laboring man with dirty hands and soiled clothing, gets an infection of a finger—trivial at first sight. He is seen, told to soak and poultice his hand and to return in twenty-four hours. The soak is given, the poultice applied—and possibly a splint—the man leaves the hospital to return home; before he gets there the dressing is cold and uncomfortable, he probably stops on the way and takes anywhere from one to six drinks, finally goes home, does not do as told, or stays in the bar or on the street talking with his pals till late in the day. When he returns to you the next day or more likely the day after, the infection has advanced with rapid strides and within another twenty-four hours is beyond the point of localization. If outpatient treatment continues, many incisions under unfavorable circumstances are required to control finally the process, if this is possible at all.

Or he may drift from one inexperienced medical man to another, each making a small "medical incision" or "cutting to the bone" and so the thing goes on from bad to worse until tendon sheaths are infected, and then follows the long and painful, disabling process of sloughing tendons, contractures, the crippled hand or finger-amputations—weeks, months, out of work and partial or total disability probably to follow. Such is the too frequent story of our outpatient cases even with the best treatment we can give them there.

Contrast the case handled by the man who insists on house treat-

ment from the very start. The tired, underfed, alcoholic laborer has his much needed soaks and poultices regularly, he is made clean, put to bed, kept quiet and comfortable, has nourishing food in plenty, frequent inspection of his hand, abstinence from alcohol and proper, intelligent incision in the proper place at the first indication that it is needed. Meddlesome surgery is not only avoided but prevented, tendon sheaths are not unnecessarily opened, no "cutting to the bone" is done, and, in the vast majority of cases the patient is able to leave the hospital in a few days with the process entirely quieted down, with the necessity probably for but one intelligent incision, and much improved in general condition.

It is possible to substantiate this contention in regard to house treatment by actual figures, as shown in our series of cases. We found that of 60 cases receiving house treatment at the onset only 10 required more than one operation to clear up the process. Of the 10 cases requiring more than one operative interference all were of a more complicated type in that they had had some kind of operative procedure before entrance to the hospital and were not strictly in the class we are describing.

Contrast these figures with a series of 47 outpatient cases in which, even under the best and most ideal outpatient conditions and under the supervision of one man especially concerned with these cases, all but six had to have more than one operation to get ahead of and control the process. These cases were not operated on or supervised by house officer, but were under the direct care of the visiting man especially assigned to care for them and received the best and most detailed care that could be given to an outpatient case.

We believe that such figures as these should receive careful consideration.

Just let us stop for a moment and think what it means to the laboring man or mechanic whose whole livelihood depends on his fingers and hands, to be laid up about a week in a hospital with an expense of from fifteen to twenty-five dollars and then to spend a period of one to two weeks longer before he can get back to work, in contrast to the man who drags along as an outpatient case, losing his work, spending days of suffering and progressing sepsis, and then perhaps finally having to be sent to the hospital with severe sepsis involving a period of weeks or months for recovery and perhaps after deforming or disabling operative procedures made in the attempt, often too late, to get ahead of an initially improperly treated, trivial infection. The contrast is a marked one and not favorable to the ambulatory case. It is furthermore an altogether too common occurrence, as the author knows from considerable experience with the outpatient type of case.

It is in no man's power to accurately prognosticate any sepsis

when first seen. The most trivial cases at the onset often become the gravest. Should we not make it a hard and fast rule that *every* septic hand or finger be put immediately to bed and carefully watched rather than to run the risk of progressive sepsis, multiple incisions and the aftermath of contractures and disability in a member which is so absolutely indispensable to making a livelihood?

From an economic point of view this is the best surgery, from a humanitarian point of view it is the best treatment, and from a surgical point of view it is the best judgment. No one heeding the contrast in these two widely different methods of treatment can for a moment deny the logic of the more careful method.

We write thus at length on this particular phase of the subject because we believe that the importance of bed treatment of these cases has hithertofore never been fully appreciated, and rarely made a practice except with a very few men.

General systemic treatment has its important place also. This is mainly by early and thorough evacuation of the bowels, the forcing of large amounts of fluids, particularly water, the avoidance of alcohol, the eating of nourishing food and avoidance of any kind of fatigue. These are commonplace enough things, but none the less of importance in turning the scale from severe to less severe degrees of infection. The whole point being not to omit any one little detail of treatment which might help in any small way in these most vitally important cases.

We have approached this subject with the economic point of view largely in mind, because we believe that economic efficiency is the final aim of our treatment. If we bear this constantly in mind, even from the first moment of seeing our patient, while dressing his hand, while making our incisions, and in all our after-care, we will give each individual hand better, more detailed, and more intelligent treatment.

In this connection it is a matter of especial interest to know which hand is the more liable to infection, whether the almost constantly used right or the less frequently employed left. We found the right involved 33 times and the left 44 times. This proportion in favor of the left we hardly expected to find. The reason probably being that the left hand being the holding hand is more often injured by things held in the right active hand.

As to the local treatment of the locally infected area we have nothing new to advance. Hot soaks and poultices with or without Bier treatment or Gamgee dressings are the routine and undoubtedly the logical routine in every case pending localization or indications for incision. The value of passive congestion in treatment we will not discuss, as the evidence from many clinics is not sufficient either to condemn or approve its employment. Personally we rarely employ it, but are content with hot soaks, poultices, and

rest in bed before incision. After incision we rarely employ moist dressings except in certain cases in which it is necessary to further attempt to localize the process.

There is one detail of treatment, however, in regard to dressings, which we wish to insist is most important as a prophylactic against future deformity and stiff joints, and that is, the immediate use of the splint in every case no matter how trivial at first. Absolute immobilization of the part in a comfortable position is essential. The hand should rest on the splint in such a way that the fingers are bent only by the presence of the padding or dressing underneath them, and in this way they are very slightly, almost not at all flexed, and are comfortable. Splints to the whole hand are urged in all beginning infections of even the fingers, so important do we consider the role of immobilization in the treatment.

Dorsal Edema.—There is a physical sign present in a large percentage of cases which in the past has not been thoroughly understood and which has often led to harmful and unnecessary operative procedures. This is the more or less marked edema of the dorsum of the hand which we found present in 45 out of 77 cases. The inexperienced operator will often be misled by this sign and open here first, when the septic focus is in reality on the palmar surface of the fingers or hand. Careful palpation of the whole hand—not with the finger and thumb in bimanual grasp—but with a smaller feeling surface, such as the very tip end of the forefinger or the point of a hemostat, will reveal the smallest localized area under tension and will serve to eliminate the dorsum in the great majority of cases as a focus of pus. Attention to this point in a large number of cases has demonstrated the rare occurrence of dorsal edema as a sign of early pus in the dorsum, but it is a very common accompaniment of any process in the lateral or palmar aspects of the hand.

Lymphangitis.—Whereas the above sign is common in the greater number of septic hands, the more commonly thought of sign, namely, lymphangitis, has been found in a rather surprisingly small number of cases: only 15 out of 77. This is explained largely on the assumption that cases are rarely seen until 3 to 5 days have elapsed since the onset of the infection and the probabilities are that by this time the lymphangitis, which was probably present in a large percent of the cases in the first three or four days, has disappeared. A careful inspection of forearms at the onset of sepsis we feel sure would show the presence of some slight degree of lymphatic involvement in all but a few cases.

Glandular Involvement.—That the lymphatics generally become involved even without visible evidence is shown by the fact that distinct glandular enlargement and tenderness was present in one-

third of all cases seen and probably runs to a much higher percentage.

White Counts.—With the onset of any degree of sepsis we expect an increase in the white blood count. This alone, however, is not a reliable guide to the seriousness of the infection but rather severe as an indicator of resistance and attempts at the establishment of immunity. The count in our series ranged from 12,000 to 38,800, or an average of 25,400. In only two cases—streptococcic cases—was a high white count the accompaniment of fatal sepsis. We feel that the white count is a factor of but very little importance in judging the severity of these cases.

Type of Infection.—Reliable information is not at hand in regard to the type of organism most common. It is supposedly a staphylococcus. Twelve cultured cases showed 7 staphylococcus and 5 streptococcus. Only the very severe cases were cultured, so that these figures are not conclusive. It is probably true that the staphylococcus is by far the most common cause of hand infection.

Influence of Previous Incisions.—We have been interested in trying to determine if possible what influence previous incisions by local physicians had on the course of the cases. In compound fracture it is definitely proven that meddling surgery by a man not prepared to carry through the treatment to a finish is productive of poor results, but from a study of this series no such definite conclusion could be reached. Except in cases in which the so-called "cutting to the bone" is done, the primary incision by the local physician seems to do good rather than harm in that, in many cases, tension is relieved, even if pus is not obtained, and a certain amount of drainage is established.

It is hoped that Kanavel's most excellent work may find its way into every practitioner's hands and that more intelligent incisions may be employed.

Type of Operation.—Improvement in our own results has been noticeable, especially in outpatient work, since the employment of lateral incisions on the fingers, thenar and hypothenar eminences, wrist and forearm, whenever the pus was not definitely localized in some midspace of palm or dorsum. In borderline cases, when the localization of the pus is not definite, the lateral exploration is much more logical and satisfactory and the assurance of not unnecessarily opening tendon sheaths greater. Small incisions are practically never indicated. An incision less than one inch, and, generally, one of less than 2 inches is evidence of timid surgery. There is far less danger of infecting healthy skin by a large incision than there is of not reaching the focus of pus and not seeing what structures we are cutting by the employing a small incision.

Necessity for Tourniquet.—The tourniquet put on, not close to the area of infection, but as far away as possible, just under the

axilla, if there is any lymphangitis at all, or at the bend of the elbow, should be employed in every case except of the most superficial character or when well localized and walled off abscesses are present. It is essential that one see what structures he is cutting. The presence of edema which often leads to the obscure focus of pus, unnecessary cutting of blood and nerve supply is avoided and above all tendon sheaths are not needlessly opened or torn, while the infected sheath can be easily recognized and the extent of the process determined and opened under the guidance of the eye. In this way we do clear, clean-cut surgery on dirty cases, and, when our operation is finished, we know the extent of the process, we can intelligently place our drains and are prepared to meet any further extension of the process that might supervene by the exact knowledge of where the doubtful looking areas were located and of exactly what we have so far done. How infinitely much better this is than to be obliged to reopen a septic hand which has been incised under any less careful methods.

Kind of Drainage.—Wet or Dry Dressings.—The importance of the right kind of drainage to be employed should not be overlooked. More important than the drainage, of course, is the thorough opening up of the septic area and the exposure of all pockets. Where this is thoroughly done under the guidance of the eye in a dry field, in the large majority of cases the use of rubber tissue drainage and a dry dressing is efficient and good treatment. The small boric wick is also of value in this type of case. It is only when the operator is not sure that he has reached the limit of the septic area that the rubber tube, wide open packing, and the moist dressing are indicated. In the first type the poultice is no longer needed to aid in localizing the infection. In the second type, its use, together with passive hyperemia, is often of greatest service in favoring more efficient drainage and in more quickly localizing the septic process.

In our series, rubber tissue was used as a drain in 23 out of 77 cases, dry dressings with or without rubber tissue in 21, poultices in 21, dry gauze as a drain in 18, boric wicks in 10, and rubber tubes in 2. We are personally much in favor of the small (in caliber) boric wick as a means of drainage. It is easy to remove because it does not adhere to the wound edge and does not act as a plug to dam back discharge, as is often the case with the hastily or improperly inserted dry gauze packs or wick. It is a much safer form of drainage in the hands of the inexperienced operator than either dry gauze which may plug, or the rubber tissue which may not leave the wound open wide enough to secure efficient drainage.

Zander Methods.—Closely following on intelligent incision, adequate drainage and the subsidence of the infection process should be the institution of passive motion and massage. This should be started in the non-affected part of the hand at the very beginning

of the subsidence of temperature, and should be extended to the involved areas as quickly as disappearance of tenderness and swelling will permit. By this means many days will be cut off from the period of disability and a vastly larger percent of early useful fingers and hands will be produced. Too much stress cannot be laid on this important adjunct to our treatment. We wish to especially emphasize the importance of early gentle passive motion and massage to the uninvolved part of the hand and particularly the wrist. If this is persisted in from the very start the whole of this area is ready for use by the time the wound is healed and active Zander methods are ready to be started on the affected parts, thus shortening by a considerable number of days the time necessary to properly limber up the whole hand. The hand, of course, should always be returned to its splint after the daily Zander treatment until the danger of contracting scar and tendons is over. Our hospital records show infinitely better results since the early institution of this treatment was recognized. Zander treatment helps in another way also. It enables us to make an earlier prognosis of the ultimate result, and joints that do not limber up within four to eight weeks of persistent Zander treatment are very liable to fall into the group of unavoidably deformed hands and as such are watched carefully for the earliest opportunity to do some plastic operation or amputation of permanently stiff fingers. By thus carefully following up the Zander part of our treatment we can again affect favorably the economic end result, by earlier plastic surgery and hence earlier return to work. These may all seem to be small points which we are making, but they are extremely important parts of a detailed system of treatment in these cases which we consider of such vital importance. Tendon involvement is unfortunately too common a sequence in sepsis of the fingers and hand. A careful study of the treatment of these hands previous to admission to the hospital leads one to believe that delayed incisions, ineffectual incision and the so-called "cutting to the bone" are responsible for tendon sheath infection in most cases. Our 77 cases showed no involvement in 38, definite involvement in 26, uncertainty as to involvement in 5 and not stated in 8. Thus a trifle over one-third of a large variety of septic hands showed tendon sheath involvement. In cases with definite involvement the results were bad, i. e., stiff fingers in spite of Zander treatment in 15, good in only 6 and unknown in 5. Thus the importance again of carrying out all the minute details of treatment, in order to avoid if possible tendon sheath infection, is emphasized.

When we analyze the results in this series of hospital cases, operated on by many surgeons and house officers, we find the following results. Out of 77 hands we find 9 which obtained a perfect result, 19 in which the result is stated as good and 3 set down as fair, imply-

ing some slight amount of deformity or disability, but not enough to prevent useful work; 9 poor results because of amputation of one or more fingers and 7 because of contractures and stiff joints. The end results in 29 cases are not definitely known, i. e., the patients have not been personally seen and inspected, but from an analysis of the history, operation and last notes it seems probable that 9 of these were good, 4 were poor and 16 remain entirely unknown. Thus 40 out of 77 cases or one-half had what might be called a good result, while about one-third of the cases had a probable poor result. There were 4 deaths from sepsis and one from delirium tremens. We believe these results are very good considering the number of men operating and the conditions of previous treatment, but we also believe that if these cases were under the supervision of one man especially assigned to treat such cases in the detailed manner outlined, the results would be far superior and the time away from work much reduced, hence the economic result better.

Profound sepsis resulting in death, in spite of every attempt to limit the process, occurs with a certain regularity in every decade or series of cases. Just what factors besides possible inadequate first treatment bring about these results it is not possible to determine. It rarely occurs in robust subjects, but usually in those showing the signs of physical or mental fatigue, or concomitant disease. We were interested to look up the deaths from profound sepsis in several periods. We found 10 such deaths in 200 cases in the years 1892-1906; 11 in 90 cases, 1906-1911; and 7 in 137 cases, 1911-1916. Such variations in percentage seem more likely due to the nature of the infection and the previous condition of the patient than to fault in a pretty well established routine of treatment.

SUMMARY.

The points which the author wishes especially to emphasize in presenting this paper are the following:

1. A vivid realization of the wonderful mechanism of the human hand and the profound economic destruction produced in it by the element of infection.

2. The great importance of considering the septic hand from an economic point of view from the very start of the infection till the man is back at work again.

3. The great importance of bed treatment for every case of septic hand or hand infection. The reduction in the number of secondary operations necessary when this method is carried out and the longer course of treatment necessary when under even the most ideal outpatient or ambulatory treatment.

4. The general treatment should not be neglected.

5. Splints should always be employed at the very onset of every finger or hand infection.

6. Edema of the dorsum is a very common sign, but more often is an accompaniment of palmar pus than an indicator of a dorsal focus.

7. Some degree of lymphangitis is found present in practically every case if looked for early enough.

8. The white blood count is not a reliable guide as to the severity of the infection. A high count may mean localized pus or lack of resistance.

9. Of the two forms of inefficient surgery "cutting to the bone" is far more dangerous than the so-called medical incision, which often relieves tension and produces drainage enough to be helpful rather than otherwise.

10. Lateral incisions are of greatest value and less liable to open up uninfected tendon sheaths.

11. The high tourniquet producing a dry operative field is of utmost importance. Careful dissection under guidance of the eye is essential to success.

12. In the large percentage of cases the boric wick or rubber tissue with dry dressings is the best form of after treatment where the process is localized. Wet dressings help to localize infections not entirely in such condition at time of operation.

13. The early establishment of passive motion and massage especially to the unaffected parts of the hand is of utmost importance in shortening the period of disability.

14. Tendon involvement is by proper care preventable and is a far too common occurrence.

15. Early plastic operations or amputations are desirable after a thorough preparatory course by Zander treatment.

THE NONSURGICAL TREATMENT OF SPLANCHNOPTOSIS.*

By ROLLA CAMDEN, M.D., Parkersburg, W. Va.

In these days of greater enlightenment of the laity and of increased progress of the medical profession there has appeared the demand for, and the wisdom of, less surgical and more conservative treatment for abdominal displacements, and we of this Society, being imbued with all ideas for progress, should be well in the lead of the other members of our profession. We all have seen many cases of abdominal visceroptosis and intestinal stasis that did not seem to require a surgical operation, or at least both we and the patient desired to try all other methods first. Again, we have had patients with these troubles who refused positively to submit to an operation for the relief of their ailments, so that it is to meet the requirements of such cases as these that I call your attention to this subject, not that I shall impart anything truly new but that I hope to give you food for thought along lines too little considered.

Without going deeply into the etiology, pathology, symptoms and diagnosis of these conditions, for I am sure we are all familiar with them, I shall proceed without too much detail to briefly consider the normal and abnormally placed organs. In the normal individual the abdominal viscera are maintained in their respective places by their respective supports and by intra-abdominal pressure, when the person is in the upright posture. Another factor which aids materially in accomplishing this is a proper poise of the body, proper in the sense that no organ pushes down upon and displaces its neighbor. The badly poised body aids in not only crowding the organs out of place, but also in so maintaining them. The organs themselves may be in varying positions of displacement, as well as degrees of malposition, when the individual is on his feet, and in extreme cases, while in the prone position.

The old maxim, "A place for everything and everything in its place," gives an idea of the peaceful relationship existing in the normal abdomen. In the person with splanchnoptosis we usually find a badly poised body, loss of health, weight and muscular strength, nervousness, a sense of weakness, backache (worse when upon the feet for long periods of time), poor digestion, sour stomach, constipation, headaches, etc. Splanchnoptosis may be considered as simple and complex. By simple I mean that the organs are merely out of place, but returnable to their proper localities; complex (extravisceral) when they are retained out of place by ad-

*Read at the nineteenth annual meeting of the American Proctologic Society.

hesions. The first should be controllable by means other than surgical. The second may be partially controlled by such methods and often is, although of course we cannot expect the same certainty of results in the latter condition, for we should realize that if adhesions have formed in sufficient strength to hold the displaced organs firmly we shall be powerless to move and restore them to their normality, and therefore, we must not expect any supernatural attainments where these conditions truly obtain.

There are many cases, however, in which the restraining adhesions may be so slight that continued efforts in the right direction will accomplish wonderful results. And while we may endeavor to treat these conditions non-surgically, yet our perspective must remain so clear that we shall be able to appreciate the necessity for surgical treatment if the time for that arrives. Our endeavor, then, is to restore the prolapsed organs to their normal regions and to maintain them there, and to increase the muscular tone and power of the patient. I have divided our treatment into three divisions:

1. *The medicinal and dietetic*, as we physicians must determine the necessity for.

The digestive functions of the body must be determined by gastric and enteric analyses. In this connection I desire to go on record as a believer in the superiority of the tube and methods of Rhefuss over those of the old tube and method of gastric analysis. With the Rhefuss tube in the stomach there is little pharyngeal irritation and the tube can remain in the organs for hours, giving us, therefore, a complete picture of gastric secretory and motor functions. By careful inflation and percussion the exact location of the stomach may be determined. Turning the patient on his right side, the olive-shaped tip either does or does not pass into the duodenum, demonstrating to a fair degree the patency of the pyloric orifice. Having determined the state of gastric digestion, such drugs may be used as may be necessary for its aid. With the ptosed stomach care must be exercised to prevent excessive amounts of food or drink, lest, by their weight, the viscus is carried still further out of position. Such an organ should receive smaller amounts of food or drink every three or four hours, rather than the usual three meals per day. Certain general tonics may be required and possibly gentle laxatives or refined mineral oil, for constipation must not be allowed to persist.

2. Those powers which the individual has within himself for the correction of his condition.

Under a recent paper I called attention to the necessity for an erect, normal posture as a means for preventing splanchnoptosis and aiding in its cure, so that I only recall to your attention the need for a normal posture if we hope to hold the organs normally, for I am sure no one will expect to restore prolapsed viscera when

the patient is carrying himself in some abnormal manner, shoulders allowed to fall forward, the back bowed and the abdomen so badly relaxed that the organs are not only allowed to sag down towards the pelvis but actually pushed from their places. Besides this aid to himself the patient should be taught the value of exercise to those portions of his body which need strengthening. The individual has usually lost flesh, the hip bones are higher than the abdomen, and the abdominal muscles poor in development and strength.

Those exercises should be undertaken which will rebuild these poorly developed muscles into normal ones, and for this there have been many forms of exercise recommended; such as stooping over and with out-stretched arms touch the floor and twisting from side to side; lying prone on the floor and with feet braced under some object of furniture to raise one's self into a sitting position and then go prone again; or, that form wherein the legs are alternately raised high while prone, sitting, standing, or walking (the German "Goose Step"); or, the forcible contraction and relaxation of the abdomen by muscular effort; also some form of abdominal massage or vibration. Swimming is an excellent exercise in this condition.

As a further personal effort should be placed cold bathing, either sponge, shower or tub, with a brisk rub afterwards, all acting as a stimulant to the sluggish circulation and depressed nervous system; also the daily cold water colonic flush or the night abdominal pack of cold cloths.

3. The external and mechanical means to be employed to aid and control this condition.

The external and mechanical measures are really not so numerous as one might imagine, they all having the same ideas of attainment and differing only in the means employed. If we have read the advertising pages of our journals, as well as the pages given over to scientific articles and case reports, we shall have seen the many corsets, braces, shoulder straps, etc., depicted therein, each claiming, of course, superior merit for his particular article.

My experience has been that all these articles have some merit, but that nevertheless they all frequently fail to give what we most desire for the patient, and this because the patient is made *to fit to the support* rather than the *latter to fit the patient*. It is not particularly hard to support the large pendulous abdomen. When this condition is present, the fat abdominal wall lends itself as a pad for pressure under the corset or support and we can obtain results with comparative ease. In marked contrast is the customary small, thin, emaciated abdomen with prominent hip bones. In these patients it is difficult to get the pressure and lift that are necessary for good results without making so much pressure upon the hip bones that the skin thereon soon becomes abraded and sore.

Of course pads of sufficient thickness to insure the proper pres-

sure may be used, but this often means a huge mass pressing upon the bladder (and uterus), which of course is objectionable. Then, too, such a thick pad is uncomfortably warm in summer. To meet the requirements I have tried many ideas of corsets, braces or supports and have had the most success when I have modified the selected apparatus to meet the special needs of the patient. This I have done in different ways. Ordinarily I have found the support made by Dr. Katherine Storm fairly satisfactory, although frequently I alter its pull in some direction or place under it a pad of especial shape. I have used a number of the corsets on the market, but usually have had to make some alteration or fit a pad of some kind.

In order to escape too much pressure on the hip bones (in *very* thin subjects), I sometimes use a rigid pad attached to straps. The pad is placed under the corset, the straps pass through openings made in the sides of the corset (above the iliac crests) and fasten by buckle over the corset at back. This gives the lifting pressure without pressing upon the hips. At other times (when the patient has an especially bad carriage) I add a shoulder brace to the corset or support, with marked results.

As a matter of experience I find the shoulder brace to be most important in many cases, as it corrects the bad position of the body and at once begins to replace the ptosed organs. Another means I have found of value in these cases is that of raising the foot of the bed some inches from the floor. This allows gravity to restore the ptotic organs for eight or nine hours each night, and it is surprising the comfort the patients derive from it, as well as the benefits which accrue.

In those with large, pendulous abdomen it is frequently necessary to have a snug abdominal binder of some kind for night wear as well, so that the organs can not fall to the sides and lie there out of position while the patient is abed.

Of course all wrongly fitting clothing must be corrected as well, and by this I mean the corset on women and the belt on men, these two articles being the means of much mischief because of their constriction, wrongly placed.

ROENTGENOLOGY OF THE NORMAL ALIMENTARY TRACT.

By C. WINFIELD PERKINS, M.D., New York City.

THE NORMAL ESOPHAGUS.

Fluoroscopic study is positively essential, but for finer detail and record plates should be taken, by such method of investigation the various phases of deglutition are elucidated in a manner impossible for the plate. For convenience of study swallowing may be divided into two periods—namely, the buccopharyngeal and the esophageal. The oblique view in the vertical position before the upright fluoroscope is necessary. The first oblique dorsoventral position is the best position, as it carries the cardiac shadow to the left, whereas in the left oblique view the cardiac shadow would obscure the vision of the lower esophagus.

A contrast mixture consisting of a small amount of mucilage of acacia with bismuth or barium sulphate is used. Other methods, as the use of a rubber skin, which, filled with bismuth, may be swallowed, are occasionally employed, but as a rule much pain and distress is a result of their use. Enough bismuth or barium suspended in the mucilage of acacia to produce a creamy mixture after a thorough stirring should be used. The proportion commonly used is one teaspoonful of the acacia to one ounce of the bismuth or barium. A little more of the mucilage of acacia may be used if it is found necessary. The amount of the mixture may be varied according to the desired outline of the esophagus, but for practical purposes a tablespoonful of the mixture is usually sufficient. The patient is placed before the vertical fluoroscope, the mass is then given and the patient is commanded to hold the mixture in the mouth until the order to swallow is given. When the patient swallows, the two periods of deglutition are noted, the buccopharyngeal and the esophageal. The bolus is seen to descend rapidly through the pharynx to the opening of the esophagus opposite the cricoid cartilage, where a slight pause is frequently observed, it then enters the esophagus proper and descends by peristaltic movements, the peristalsis becoming more pronounced the nearer the stomach. In a period ranging from two to eight seconds the mixture reaches the stomach. The sphincteric action of the cardia may likewise occasion a pause. As mentioned, the peristalsis of the esophagus is always more marked the nearer the approach to the cardiac end of the stomach.

The following deviations of the esophagus are seen on examination either with the plate or screen. A slight deviation to the left at or near the sixth or seventh cervical vertebrae. The course is then anterior to all the dorsal vertebrae, until the twelfth is reached, when it is seen to proceed at an angle to the left and then penetrate the stomach at its cardiac end.

It is well to note the narrow portions of the organ, namely: opposite the cricoid, immediately above the arch of the aorta, at the crossing of the left bronchus, and at the diaphragm. These are frequently the points where foreign bodies are impacted or otherwise retarded on their journey toward the stomach.

THE NORMAL STOMACH.

Roentgenology has rendered possible the examination of the human stomach in the living individual under ordinary conditions, and therein lies its greatest value as an aid in diagnosis. The information thus obtained has forced us to change many of our conceptions of that organ, which were based on less accurate methods of examination, such as the operating table and the postmortem examination, the conditions of which are of an entirely different nature.

The methods employed may be classified as the roentgenographic and the roentgenoscopic. The roentgenographic is commonly called the direct method of examination, and the roentgenoscopic the indirect. The roentgenoscopic consists of placing the patient before the fluoroscopic screen, and observing with diaphragmed rays the filling of the stomach, peristalsis, and emptying power. Such an examination may be supplemented at the time with palpation by the gloved hand or with any specially constructed mechanical palpator. With the modern protective devices now in use, such an examination is without any danger to the patient if handled by a skilled operator. This method, which is unquestionably the simplest, is probably the most difficult, as it is necessary that the operator should be trained to see quickly and accurately the various types of shadows and movements of the stomach which to the occasional observer seem dim, indistinct, and of very little meaning. The roentgenographic, or direct method, on the other hand, gives more clearly defined shadows, demonstrating the different phases of the peristaltic contractions of the organ, that is, if enough negatives are made, showing all the phases of the peristaltic contractions. By experience, it has been determined if exposures are made at five-second intervals, the various cycles of the stomach contractions can be easily demonstrated. This method is more expensive but more accurate, and allows the observer to make a careful study of the organ, besides giving a permanent record. The combination of the plate and the screen is undoubtedly the best all-

around procedure. A third method, the cinematographic, as first demonstrated by Kaestel, Rieder, Rosenthal, and Beclère, of Paris, and later in this country by Cole, combines many advantages of the former, but owing to the enormous expense entailed in its operation, can hardly be deemed practical.

To describe the normal of an organ of which it has been said that the only constant thing about it is its varied form and changeable position, is an exceedingly difficult problem. However, a working basis must be formed, and we will endeavor to approach the solution. When the stomach is empty, it is contracted so that its walls lie in contact with each other except at the cardiac orifice, where an air bubble usually separates its margins, the so-called "*Magen Blase*" of the German text books. The full stomach as seen with the roentgen ray in no form resembles the type of that shown in the text book anatomy. However, if the stomach be distended with gas, tonus of the musculature, and we have a record of form, shape, and position, corresponding to the roentgen anatomy, The anatomic shape is largely determined by the muscular tonus, and it is this shape which I desire to describe in this brief roentgenological outline. In 1881 Lesshaft, before the Medical Congress at London, described the stomach as "usually vertical in position, with its fundus touching the diaphragm, its lesser curvature to the right, and its greater curvature to the left and downwards, the antrum of the pylorus turning up to the right, and often backwards as it connects with the duodenum." Remarkable as this description may seem, for practical purposes it corresponds to the present day roentgen ray anatomy of the stomach.

Two types of stomach are in existence and they are classified according to Holz knecht and Haudeck as the "Steer Horn" and the "Fish Hook" type. The "Steer Horn," as the name implies, resembles the horn of a steer, having a broad base and narrowing toward the pylorus, the pylorus forming the lowest part of the stomach. When the individual lies in a recumbent position, the size, shape, and position are distinctly changed from pressure of the surrounding organs. The steer horn type is associated with deep-chested and muscular men, and rare in women. The common type of stomach is the "Fish Hook" or "J" type of stomach; its axis is nearly always vertical, but it may be at times slightly oblique. This type of stomach is found in nearly all women and many men.

Schlesinger has given us the following classification, which has been adopted by many roentgenologists on the continent and in this country. This classification divides stomachs into four types depending upon the tonus of the musculature, or, in other words, the ability of the stomach to hold its contents firmly in suspension.

They are as follows: First, the hypertonic, or the "Steer Horn,"

second, the orthotonic, or "Fish Hook," and third, the hypotonic, which is the type where the greater and lesser curvatures are relaxed and the caudal end of the stomach. Some authorities classify the atonic type of stomach as an exaggerated form of the hypotonic. It is associated with a greater degree of collapse of the curvatures than the hypotonic, and hangs like a loose bag well down into the pelvis, frequently with the greater curvature four to five inches below the interspinous line of the pelvis. As previously stated, the shape and form of the individual have much to do with the shape of the stomach, the broad abdomen, deep-chested individual having the high, oblique, and hypertonic type of stomach, while the long, narrow abdomen, the same type of chest, has the vertical, or orthotonic type of stomach. Any one of these types of stomachs may be normal when the individual patient and form is considered, for example, an atonic type may be and may not be pathological. Other factors may also cause variation in shape and size of the stomach, and they should always be considered in making an examination. They are the respiratory excursions of the diaphragm, over-distension of the colon with gas or feces, tumors or displacements of other organs, and changed contour of the individual due to tight clothing, such as corsets, etc.

For study, the stomach has been divided into three portions: The pars cardia, the pars media and the pars pylorica. Beyond, we have the bulbus duodeni, which consists of the first portion, and is frequently called the cap, having a similarity to the monk's hood or the Liberty cap, well known in the history of the French Revolution.

The position of a normally filled stomach depends largely on the position assumed by the individual. In the upright position, the greater portion lies to the left of the median line, while the pylorus may be located in the median line, but more often to the right about one and one-half inches, and about three inches above the interspinous line. In the horizontal posture, naturally, this portion extends more to the right. In men, a condition of hypertonicity is more often shown, while in women, the tendency is always toward hypotonicity of the organ. There are practically no normal limits to the size, shape, and outline of many stomachs, which are absolutely normal in action and digestive powers, for frequently they may be found with their greater curvature three to four inches below the interspinous line. The average normal variation of the lowest point of the greater curvature may be from two inches above the interspinous line to two inches below the same line, and even lower.

The capacity of the normal stomach ranges from twenty-four to thirty ounces, and any departure from this is usually abnormal. The only positive fixed point of the stomach is the cardia. The

other portions are freely movable under palpation during a screen examination. The outline of the stomach is smooth and regular. While the stomach is in action, and the filling process is watched, the food, in passing through the cardia, is seen to be held momentarily at the pars media, then drops to the bottom of the sack, seeking an apparent groove along the lesser curvature. This groove is a gutter-like affair (*canaliculus gastricus*) formed by the contractions of the circular muscular fibres of the stomach. It is probably a relic of congenital development. As more food is taken, the stomach assumes its normal contour. When it is filled, the peristalsis usually begins in the pars media, and as observed originally by Groedel, these waves form into rhythmic and arrhythmic movements. A stomach cycle usually consists of about four waves. Some authorities name this action the systole and diastole of the stomach. As the systole and diastole usually means the emptying and refilling of an organ, it would seem that such a nomenclature was rather superfluous, and not tuned to the actual physiological action. The function of the waves is to thoroughly mix the food. The wave length is deeper on the lesser curvature than on the greater. At the pyloric end the wave disappears and the food passes into the *bulbus duodeni*, filling it out in its characteristic triangular cap formation. Sometimes the second or third wave starts before the first has reached the pylorus. The process of wave formation is called a stomach cycle, which is a normal functional process that begins over again normally in fifteen to twenty seconds. The peristalsis of the stomach is markedly influenced by a condition of high acidity or low acidity.

As the stomach empties itself, it becomes more permeable to the ray, and rugae and folds are seen. The same results may be produced by pressure on the normal stomach when filled.

The emptying time of the normal stomach varies considerably according to the type of the organ. For instance, the hypertonic type usually empties in two to three hours, the orthotonic in four to six hours, the hypotonic in six, and the atonic may be a little longer. Six hours is considered the normal emptying time of the stomach. By conclusion of evidence of many thousands of examinations by many investigators in America and on the continent, it has been proved that as a working basis, the six-hour emptying time is sufficiently accurate, conditions from every standpoint being considered.

Following is the report,¹ with conclusions, of the examination of 58 normal stomachs radiographed in the vertical position filled with the bismuth meal (buttermilk and bismuth subcarbonate): 28 in females, of ages from 12 to 82 years; 30 in males, ages from 17 to 66 years, or 58 cases in all. Types of stomachs found, males,

¹Perkins: *The Normal Stomach* (New York Med. Jour., Jan. 8, 1916).

hypertonic, 5, orthotonic, 22, with hypotonic tendencies, 2, hypotonic, 1. Females, hypertonic, 3, orthotonic 13, hypotonic, 12. The tendency of the male stomach is therefore toward hypertonicity, while that of the female is toward hypotonicity.

CONCLUSIONS.

Peristalsis does not seem to exert any influence on the tone of the stomach, for we may have exaggerated peristalsis with a hypotonic stomach and diminished peristalsis in a hypertonic stomach.

There are no determined fixed points of any type of stomach in the abdominal cavity, except the cardiac portion.

A stomach may be of any of the types and yet be normal from an x-ray standpoint.

The average normal stomach is orthotonic. The usual position of the orthotonic stomach is as follows: Greater curvature (lowest point) one inch above the interspinous line, at the line or slightly below, either median or to the left, lesser curvature (lowest point) one to three inches above the same line, median or one or two inches to the right.

The pylorus is placed two or three inches above the line, in the median position or one and a half inches to the right.

The axis of the stomach is vertical and parallel to the median line.

The length is eight to ten inches and the width three to three and a half inches.

The tendency of the male stomach is always toward hypertonicity, while that of the female is toward hypotonicity.

The stomach is not, as a rule, as high in the abdominal cavity as many textbooks of anatomy teach. There is no other structure in the human body, however, that has such variations in form, tone and position.

The radiographic examination, either by the fluorescent screen or plate, is the only accurate method of ascertaining the anatomical position, form, peristalsis, and mobility of the stomach.

THE NORMAL DUODENUM.

Anatomically and as visualized with the plate or fluoroscopic screen, the duodenum is divided into four portions, the first portion pars superior or bulbus duodeni nicknamed the "Cap" on account of its similarity to the "Liberty Cap" or "Monk's Hood." The second portion is called pars descendens, then follows the horizontal portion (pars inferior) and the fourth short portion, the pars ascendens.

In the adult the duodenum passes backward and upward and to the right between the quadrate lobe of the liver and the neck of the gall bladder; it then curves sharply, descending along the right

margin of the head of the pancreas, generally to the level of the upper border of the body of the fourth lumbar vertebra; again turning sharply, it passes transversely across the vertebral column slightly upwards. In its fourth portion it ascends for about two and one-half centimeters, ending at the duodeno-jejunal junction, which with the patient supine, ends at or opposite the second lumbar vertebra.

The first portion usually called the bulb, extends from the pylorus to the neck of the gall bladder. It is also the most freely movable of the four portions. The upper part of the first portion is attached to the duodeno-hepatic ligament. The bulbous is in such close relation to the gall bladder that it is often found bile stained after death. Thus it is easy to comprehend why so often it is involved with adhesions following cholecystitis and pericholecystitis. The bulbous is usually 5 to 6 centimeters long, triangular in shape, the base of this triangle forming the duodenal side of the pars pylorica. According to L. G. Cole, the bulb has the shape of a cap, so frequently mentioned in roentgenological literature. This bulb, or cap, surmounts the pylorus and the size and shape of the bulb correspond more or less to the size and shape of the pyloric end of the stomach. With a large pyloric antrum we have a corresponding large duodenal bulb and vice versa. The outline of the bulb is smooth, triangular or elliptical if no disease or adhesions are present. This bulb may be pushed to the left by pressure or pulled to the right by adhesions. It may also be normal while the pyloric end of the stomach is to the right or to the left. Normally it should be slightly movable.

The second portion of the duodenum is 8 to 10 centimeters in length. It usually extends from the first to the fourth lumbar vertebra, depending on the type of individual, position, and respiratory movements of the patient. One is occasionally able to make out the insertion of the ampulla of Vater where the common duct and the hepatic duct enter the small intestines, about 8 to 9 centimeters from the pylorus. This portion very nicely shows the feathery serrations due to the Kerkringen folds. This part may be very large and yet not overdistended. The duct of Wirsung and the common duct may form a common diverticulum or pouch, or this condition may not exist but have the ducts open side by side in a common papilla, the opening of which is 2 to 5 millimeters.

The third and fourth portions are 7 to 10 centimeters in length and are more or less fixed to the neighboring viscera and abdominal wall, and yet at times a marked mobility may be demonstrated.

Technic.—The patient standing erect before the fluorescent screen swallows a third to a half a glass of water, impregnated with bismuth or barium, stirred thoroughly. One now watches the action of the pyloric region. This mixture should normally pass within

a few seconds or at once into the duodenum. When one is able to demonstrate the form activity, peristalsis, and mobility of the pyloric and duodenal areas. This is followed by the full meal. When observations are made in both the erect and supine positions in all possible angles under palpation. A good plan, I think, is to have the patient lie on the right side, take a deep breath, and hold, then turn quickly on his back again. This procedure will very often fill an apparently contracted duodenal bulb. The patient may also be asked to lie flat on the abdomen, which will very often fill out what may otherwise seem a contracted or irregular duodenum. It may also be added that this position is very satisfactory for watching the activity. Additional information can also be obtained by blocking off the duodenum in the horizontal portion with a gloved hand or perhaps better with a palpator. It is needless to say that this particular technic is difficult and not possible with very stout and very muscular individuals.

The technic of Holzknecht and Lippman which is done in the vertical position, by pressure over the duodeno-jejunal junction, by which means the duodenum is filled out, thus causing a reverse peristalsis resulting from the artificial obstruction, and thus outlining what might before have appeared as an incomplete filled duodenum. Serial roentgenograms, after the method of Kaestel and Pirie, will demonstrate very accurately and beautifully the mechanism of the duodenal bulb activity. This wave usually carries the bolus of material the entire length of the duodeno-jejunal junction. Reverse peristalsis in the duodenum has been observed by some authorities independent of respiratory movements. However, reverse peristalsis is usually associated with a pathological entity.

The study of the patient in the right lateral position is also useful, especially in the study of the pyloric antral activity, which lends itself to further study of the phenomena of duodenal peristalsis and activity.

THE NORMAL COLON.

The application of the Roentgen ray for the investigation of the colon has upset many of our preconceived ideas relating to the morphology, position, and physiological action of the large bowel. The earlier studies of the stomach and the colon began when the question of prolapse of the abdominal viscera was an absorbing topic of discussion, therefore the original investigations studied the question of prolapsus of the organs and were naturally made with special reference to the morphology, peristalsis mobility, and the position of the various portions of the colon. With increasing experience and with the observation of many cases fluoroscopically and with plate examinations, the question of pro-

lapsus, visceroptosis, etc., has gradually become insignificant and we have begun to recognize the bowel, in its form, position, mobility, and peristalsis fits a certain type of individual the same as the stomach. Of all findings the question of prolapsus should be given the least consideration. To recapitulate and parallel my previous remark about the stomach, to describe an organ of which the most constant thing is its variability is exceedingly difficult. The same thing can be said of the colon.

For the purpose of roentgenological study we may divide the colon into the following anatomical subdivisions. The cecum, ascending colon, transverse portion, and the descending colon which is divided into the iliac and pelvic portions, the latter is subdivided into the sigmoid and rectum.

Following the original work of Cannon in America, new data have been obtained and new light thrown on the function of the colon. As a result of his investigations and his ideas much work was done in successive years in the continental clinics. Case and others in America have presented us with excellent monographs dealing with profound studies of the mechanical action of the intestine with reference to human beings.

In common with the entire gastro-intestinal tract, there is the inner circular layer and the outer muscular layer of fibres. At three points on the circumference, the longitudinal layer is thickened into three bands which are shorter than the section of the bowels along which they pass, hence the puckered or haustral formation characteristic of the colon. If the longitudinal muscles are removed, then the haustral appearance vanishes and the intestine elongates somewhat, about one-sixth. During the Roentgen examination one frequently sees the elongation of the longitudinal muscular striations, with an elongation and obliteration of the haustral formation; in a few minutes the intestine, by reason of its longitudinal fibres, contracts again and the haustral formation reappears. This phenomenon is especially associated with the peristaltic movements or waves. According to Case and others the prevailing movement of the proximal one-third of the transverse colon is antiperistalsis, which may be termed a reverse wave movement backward toward the cecum. This movement has been demonstrated to be for a physiological purpose, that is to lengthen the food rest in the cecum and ascending colon for digestive purposes.

Cannon also discovered that the peristaltic wave originated in a tonic constriction, which is normally found in the transverse colon to the right of the median line near the hepatic flexure. By x-ray examination of many gastro-intestinal cases this ring has been frequently demonstrated by myself in the laboratory. Case in his experiments has often demonstrated this particular phenomenon of the colon.

Just as obstruction in the stomach exaggerates the peristaltic waves, the same activity is noted in the intestines under the same circumstances and antiperistaltic waves may be observed as a natural sequence when any obstruction occurs in the distal colon, the antiperistaltic waves which normally occur in the right half of the colon being exaggerated. Retrograde filling of the colon is a constant finding after an ileosigmoidostomy, unless the colon is removed to the point of anastomosis of the ileum. If there is obstruction beyond, antiperistaltic waves may be demonstrated in any portion of the colon from the ascending portion onwards, depending on the point of obstruction. The other movements may be classified as the churning and propulsive movement which serves to keep the content matter thoroughly mixed with the digestive fluids. As they are slow they are very difficult to visualize in a fluoroscopic examination, that they exist there is no doubt, for they can be demonstrated on plates taken at one-half-hour intervals.

It has been my experience in common with others, to note the frequent change of position of the transverse colon without any special activity of the peristalsis. It is frequently found above the interspinous line and below forming a V shape. Rieder in 1913 described this condition and has since been confirmed by Case and others. This change in position is supposed to be due to the muscular contractility of the smooth muscular fibres of the mesocolon. I am, however, led to believe that the position may also be influenced by amount of food content and amount of absorption due to digestion lessening the weight of the colon. Gas in the colon may also influence the position to a considerable extent.

The most definite movements of the bowel as seen on the plate or upon fluoroscopic examination are the mass movements originally described by Holzkmnecht in 1909. This mechanism may be described and seen as a segment of the bowel suddenly loses its haustral markings and an ovoid sausage mass is formed with smooth edges, it is propelled with motion visible on the screen, it comes to rest, and then the haustral formation is observed to again appear. These movements are always quicker if the contents are fluid and naturally of more retarded formation if the bowel contents are more solidified. The respiration and movements of the diaphragm are important factors to be considered in colonic movements as the hepatic and splenic flexures share also in these excursions, the other portions of the colon may likewise be affected.

Experiments have proven that the contents of the intestines can be changed little in position by palpation even when associated with pressure, with such movements it is not possible to lift up or advance the colon (Case). My experiments along this line have confirmed the above statements. Groedel has effected a movement of the meal content by vibratory massage, but, generally, speaking,

the peristaltic action of the large gut is not influenced by palpation, massage, or electricity. The good results from such treatments are evidently indirect by stimulation of the nerve centers.

In studying the morphology of the intestines as with the stomach a normal of wide variance must be considered and it will be noticed that the text book and operating-room studies differ widely and to a marked degree from the living colon, purge-free and free from the depressing effect of anesthesia. Therefore the only satisfactory method of studying the colon is after the barium meal, with the plate or with the fluoroscope, whereas in the clysma or enema filled colon the colon is notably often distended. The use of various positions during an injection of an enema may also lead to serious misunderstandings as to the morphology of the large gut. More satisfactory work in watching the activity of the colon can be done by the meal from above. However, when noting the contour and general shape for defects and obstruction the enema is primarily necessary.

That the colon as regards morphology requires less study as to its form, shape, and size than the other organs, namely, the stomach and duodenum, is without question, for comparative studies on the same patient within a few hours will demonstrate how variable the position, shape, and contour may be in a short space of time. The size and calibre necessarily depend largely upon the amount of content and its consistency.

Briefly I will endeavor to describe what may be called an ideal colon. With the patient in the vertical position, on the average the cecum reaches the iliopectineal line or slightly below it, the colon then extends upwards as far as the costal margin and from there to the splenic flexure as high as the spleen. The level of the lower border of the transverse colon varies considerably in the different patients according to the type of individual, for example, in the short stocky deep and broad-chested person with some obesity, the transverse colon is in keeping with the stomach, the colon is observed just above or on a line with the interspinous line dipping down somewhat in the center and much higher toward the splenic flexure. In the slender type of person the transverse colon in the vertical position is usually V- or U-shaped, with the lower border, as a rule, several inches below the interspinous line. Naturally in the recumbent position the transverse colon is always higher in all types, unless some pathological change, like adhesions, should hold it down. The iliac colon from the splenic flexure downwards is fairly constant in size, form, and position and usually narrower and demonstrates less haustral formation, the terminal end before it enters the sigmoid in many individuals is considerably narrower than the proximal portion. This is a fixed point and contains bands of the meso colon. The sigmoid or pelvic colon is very variable in length, size, and position.

The mobility of the colon is rather constant at all the points which can be reached by the manipulating hand. The cecum and ileum should be movable in the average person from 1-1½ inches, the ascending colon can be laterally displaced about one to two inches. The hepatic flexure is more or less fixed and sometimes it is not within reach of the palpating hand, being under the margin of the lower rib on the right side. The cecum ascending colon and hepatic flexure can at times be displaced *en bloc* toward the mid-line with the palpating hand. The transverse colon is normally fairly mobile, and can be displaced up and down from 2 to 3 inches. The first portion or proximal end of the transverse colon is frequently found in alignment with the ascending colon, but it can easily be displaced by the palpator or the gloved hand under the fluoroscopic examination. The same can be said of the two legs of the splenic flexure which is much higher and rarely found adherent. The descending colon can be said to be the most constant in position, less variable and usually narrower as compared with the other portions of the colon, except at the juncture of the iliac portion to the sigmoid or pelvic colon, the descending colon is movable, at the above point the meso-colon is short and the portion is fairly fixed.

The sigmoid is freely movable but difficult to palpate, especially in the obese or heavy persons with pronounced muscular development, manipulative procedures in such patients being very difficult. The contrast enema is of far more value in the study of the sigmoid, ampulla, and iliac colon.

Aside from my own observations as stated in these papers I desire to acknowledge my indebtedness to the continental literature on roentgenology and last but not least to the splendid work done by our own American observers the past few years.

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X-RAY DIAGNOSIS OF PULMONARY TUBERCULOSIS.

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The importance of x-ray diagnosis of diseases of the chest in general and tuberculosis of the lungs in particular is so well established that an apology for its indispensability is no longer necessary. Skeptics as to its value in diagnosis are very few today, and they are only such who expect 100 percent correct diagnosis. Any failure causes them to point at the x-ray with discredit. To such we can only speak in the words of I. S. Hirsch, that there is no diagnostic method as yet that would always be infallible. Based on the work of others and our own experience, we can state emphatically, that of all the useful laboratory methods, the x-ray stands out as equal to most and superior to some. We have no right to claim this method as the most important, but in conjunction with other old established methods, it is of most valuable assistance. In pulmonary tuberculosis and in numerous lung conditions from which this disease is to be differentiated, the x-ray is in many cases the deciding factor.

Method.—Fluoroscopy or radiography? Fluoroscopy and radiography are the methods in use. Controversies as to the respective value of each have not been lacking and to some extent even exist today. Like in all polemics, the impartial one gets the benefit of the good contained in the various opinions, so in the x-ray diagnosis, the controversies have been a source of benefit to such who impartially avail themselves of both methods. Fluoroscopy cannot replace radiography and vice versa. For example, the cough phenomenon of Kreutzfuchs, mobility of the diaphragm, pulsation of the heart and the large blood vessels, etc., only fluoroscopy can disclose. Exact differentiation of shadows, origin and extent of involvement of a tubercular lesion and the study of details in general, radiography, and if necessary, stereoradiography, are of supreme importance. Our aim is to make a diagnosis, if fluoroscopy alone can do it, well and good. In most cases both methods should be employed. We feel that the two methods can be compared to the listening of a good lecture and then reading the same in print.

Technic.—As this article is intended for the general practitioner's information, it would be out of place to go into a detailed description of technic. A few essential remarks with special reference to fluoroscopy shall be made. The fluoroscopic room must be so dark as to exclude every ray of light. The examiner should remain in the dark room for at least ten minutes before attempting to fluoro-

scope. If entering the dark room from the street on a bright sunny day, it may be necessary to prolong the time of adaptation. The longer one remains in the dark room, the more exact are the definitions of the parts examined. The protection to the patient against the injurious effects of the rays are met with by apparatus of modern type. The operator should wear a leaden apron, gloves, and, if necessary, leaden glasses. As to position of the patient, it is best to examine him standing with his back to the tube (dorso-ventral) and front to tube (ventro-dorsal), left and right, oblique, also known as first and second diagonal positions. The position of the tube to the patient is to be changed depending as to whether one fluoroscopes in the dorso-ventral or ventro-dorsal position. With the former the tube should be focused at a level opposite the seventh dorsal vertebra, with the latter, focusing at a higher level is preferable. As a result of ill focusing, shadows simulating diseases may be seen. For instance, fluoroscopying a patient in the dorso-ventral position with the tube focused at a level of the third or fourth dorsal vertebra, the normal apices will appear shadowed. When we lower the tube, with focus at a level of ninth or tenth dorsal vertebra, normal bases appear shadowed. The sitting position is employed only when the patient is unable to stand. Horizontal position is often of diagnostic importance, as, for instance, in interpreting pleural effusion. Distance of patient from the tube should be from 35 to 40 cm. The greater the distance, the better the protection to the patient, but smaller the parts examined appear. Telescopic fluoroscopy like teleroentgenography introduced by Alban Koehler necessitates having the patient away from the tube from $1\frac{1}{2}$ to 2 meters. The organs so examined are seen in their natural sizes. For finer detail, especially in studying apices and hilus, bordering off the parts to be examined by means of a diaphragm is indispensable. For the sake of magnifying parts, the screen should be moved away from the patient, the further it is away, the larger appear the parts examined.

As to radiography of the chest, it is absolutely essential to take plates in the ventro-dorsal, dorso-ventral position and apices. For a detailed study of mediastinal structure, plates of one or both diagonal positions are of importance. For a detailed study as to the origin of tubercular focus, exact depth of same, stereoradiography is valuable.

Description of the Normal Chest.—Before entering upon the discussion of pulmonary tuberculosis, it seems to us not superfluous to outline briefly the normal x-ray appearance of the chest. In speaking of the normal chest from the x-ray standpoint, its appearance in the dorso-ventral and ventro-dorsal positions is usually referred to.

We see on the screen or on the plate (Figs. 1, 2) two bright sur-

faces (lungs) separated in the middle by a club-shaped shadow with its broad end downwards. The upper and lateral boundaries are formed by the soft tissues and the bony structures; below by the diaphragm. The bright shadow is interrupted by shadows running parallel to each other (ribs). The posterior curves of the ribs are more distinct with its concavity downwards, the anterior curves are less distinct and concavity upwards. The cartilages of the ribs do not normally throw a shadow, but if they do, they must not necessarily be diseased. The clavicles are seen as distinct shadows forming almost the uppermost border of the chest. The scapulæ appear as bright, indistinct triangular shadows.

The central shadow is formed by the heart, large vessels, spine, and sternum. Just above the junction of the sternum and clavicles, a bright zone extending vertically upwards into the neck which shows the air-containing trachea. The central shadow was only roughly mentioned as the pathological description of same, will not be considered in this article. On the other hand, the chest structures, like lungs, glands, bronchi, pleura, and diaphragm, the x-ray pathological appearance of which we intend to discuss, should also be considered in greater detail when normal.

Lungs.—The light zone of the lung on the right side appears brighter and broader than on the left, because part of the latter is occupied by the auricle and ventricle of the heart. Normally, the demarcation of the lobes cannot be visualized. The apices are bounded below by the clavicles and laterally and above by the first ribs and soft tissues. While our expectations are that both apices of an individual should be equal in all dimensions and equally bright, it is important to note that this is not the rule. Firstly, because very few persons are so perfectly built that symmetry of skeleton and musculature should prevail. As the apical shadows are so greatly influenced by lack of symmetry of skeleton and musculature, it becomes evident why one apex may differ from the other. The right apex because of the stronger musculature of the shoulder in right-handed people, throws a darker shadow than on the left. The reverse is true in left-handed people. The least curvature of the thoracic spine darkens that side of the apical shadow where the convexity of the spine points. In general, it should be remembered that the ventro-dorsal aspect of the apices is darker than the dorso-ventral on account of the greater musculature in the supraspinous process. That the position of the tube influences the appearance of the shadow has been mentioned above. As to the rest of the lung, the nearer to the base the brighter the shadow, but the position of the tube (low position focused at eighth to ninth dorsal vertebra) will darken the bases. The ventro-dorsal aspect of the lungs as a whole does not differ from the dorso-ventral, only that the apices do not appear so bright and the shadow

of the vertebra is more distinct, especially so when a hard tube is used. In the first diagonal position (Fig. 3) three separated bright zones running vertically are seen (lungs). View from left to right, the first zone is bounded anteriorly by the musculature and ribs, inside by the outer border of the spine, and below by the diaphragm. The second zone is bounded outside by the inner border of the spine, inside by the heart and vessels, below by the diaphragm. The third zone is bounded inside by the heart and blood vessels, outside by the ribs, and below by the diaphragm. In the second diagonal position almost similar zones are observed.

The normal lungs do not present a uniform bright zone, but linear markings from the root of the lung upwards to about the third rib and downwards almost to the base, but not to the apex nor the periphery are seen. There are fine linear markings which near the base have a broom-like appearance. Besides this, at the root, opposite fifth, sixth, and seventh dorsal vertebra well marked on the right side, and less on the left, because of the overlying heart, there is the hilus shadow. It is universally agreed now that the hilus shadow is cast by the lymphatics, blood vessels, and bronchi. We also see ring-like areas in the region of the hilus and towards the base about 6 mm. in diameter which are medium sizes bronchi filled with air. Pleura and glands when not diseased throw no shadow.

Mediastinum.—Boundaries: posteriorly by the dorsal vertebra, anteriorly by the sternum, laterally by the pleura. Contents of mediastinum: anterior, ascending, and arch of aorta, pulmonary artery, phrenic nerves, superior vena cava, and thymus. Posterior: descending aorta, vena-azygos, esophagus, vagi, sympatheticus, and thoracic duct. Lymphatics and bronchi are equally distributed.

Diaphragm.—The most important respiratory muscle was made accessible to an exact physiological and clinical study by means of the x-ray. The normal diaphragm as seen roentgenologically, is a dome-shaped organ separating the thorax from the abdominal cavity. Dorso-ventrally and ventro-dorsally it looks divided into a right and left cupola, the right higher, the left lower. With the chest at rest in the upright position, dorso-ventral, the right cupola is at the upper border of the fifth rib and the left at the lower border of the fifth rib. Posteriorly, the right dome is at the upper border of the ninth rib. Forceful inspiration lowers it 3 or 4 ribs. Posture influences position of the diaphragm. Sitting lowers, lying raises it. In the upright and sitting position the dome shows the convexity upwards, while lying down, the dome assumes a more flattened-out appearance.

At the junction of the diaphragm with the ribs, there is normally an angle, known as the phreno-costal angle (p.c.); at the point where the diaphragm meets the pericardium is the phreno-

pericardial angle (p.p.). These angles normally brighten up with inspiration. The greater the convexity of the dome, the more pronounced are these angles. The status of an individual influences the position, shape, and mobility of the diaphragm. In the status apoplecticus the diaphragm is higher, more flattened out, and less mobile than in the status asthenicus (*habitus Stiller*), in which the diaphragm is lower, and moves more freely. While the scapulæ hide all except that muscular membranous part of the diaphragm resting against the liver on the right, and stomach and spleen on the left, one can see in the left hypochondrium when the air bag is distended, a strip of musculature indicating the posterior insertion of the diaphragm.

Pulmonary Tuberculosis.—That the x-ray has furnished an unusual opportunity for exact diagnosis of pulmonary tuberculosis in its incipency, is no longer doubted. The controversial side as to the importance of x-ray in the early diagnosis in pulmonary tuberculosis gained strength, when it was found that patients with rales at the apex and even the presence of tubercular bacilli in the sputum were reported to have negative x-ray findings. The answer to this is that limited small infiltrations throw no shadow. There are some specialists in pulmonary tuberculosis even today who disclaim the qualification of x-ray as an aid in the early diagnosis because infiltrations throw no shadows. Such men certainly do not act in the best interest of diagnosis. Those who have followed up the development of the x-ray of pulmonary tuberculosis, appreciate that it has not only aided in the early diagnosis, but it has stimulated investigation and established beyond any doubt that in the greatest majority of cases the initial focus is in the hilus, a region inaccessible to any other method but the x-ray. Only as recently as 1911 pathologists like Von Hansenna, Orth, and others almost ridiculed the famous clinician, Friederich Kraus, who, because of his belief in the efficiency of x-ray, diagnosed early pulmonary tuberculosis according to the changes in the hilus. The studies of Ghon, De Lacamp, Dunham, and others have conclusively demonstrated that even in adults in the greatest majority of cases the disease originated in the hilus.

According to Jordan, apical lesions alone occur in 20 percent of cases, other observers claim only about 5 percent. Our experience corresponds much more with the lower figures.

There is no uniform agreement as to the exact point of origin of an initial focus of a tubercular lesion. From the diagnostic standpoint, it is interesting that most observers trace the lesion to the region of the hilus. The exact studies of Kemon Dunham, point to the fact that the primary focus is in the lymphoid tissue, hence the fan-shaped appearance extending from the hilus to the periphery described by the same author. Birch-Hirschfeld claims that the

middle sized bronchi are the seat of the initial lesion. Nichols speaks of the interlobular branches, Tendeloo and Jordan the peribronchial tissues, and Ghon the parenchyma of the lungs as the initial seat of a tubercular focus.

We see, therefore, that in discussing early tuberculosis, we have to direct our attention (a) to the hilus, (b) to the apices. Before doing so it seems to us practical to follow the method of Groedel and that of Riviere in first outlining the kind of shadows the various lesions of pulmonary tuberculosis cast.

Shadows.—Caseous material casts a dense shadow with a sharp outline. Fibrous tissue tends to run in lines. Calcified tissue casts an intense clumpy shadow. Miliary tuberculosis is characterized by stippling only seen in close proximity. Cavities are seen as circumscribed areas with a light zone in the center surrounded by a dense ring, the brightness of the central zone depends as to whether the cavity contains only air or air and secretions. Caseous cavities are seen as grayish shadows. Glands are distinguished by dense circumscribed shadows varying in size from a pea to a hazel nut. Evidence of a fresh process is indicated by small flecks with tendencies to coalesce.

Hilus.—In studying tuberculosis of the hilus, it is important to determine whether we are dealing with a healed or an active process. The former (Fig. 4) is characterized by a dense, elongated quadrangular shadow mostly on one side. It extends from the second to about the fourth rib along the outer border of the pericardium. The width is about 5 cm. and the butterfly appearance is still well maintained. From the hilus small strands project upwards to the second rib and downwards to the base. Calcified glands varying in size from 2 to 10 mm. situated mostly at the hilus, some seen near the apex, and others at the base. Acute processes originating at the hilus, have the following characteristics (Figs. 5, 6, 7): Mostly unilateral, the shadow is denser than that of a healed lesion, the butterfly shape is obliterated, the area is more or less circumscribed, and there is distinct evidence that coalescence of several foci had occurred. Vascularization is quite marked, and linear markings are seen to extend towards the periphery and the apex. Dilated bronchi indicated by ring like shadows of various sizes depending on the degree of associated bronchitis are usually seen at the hilus and at the base. Small areas of compensatory emphysema in the region of the diseased hilus can easily be made out on the plates.

Differential diagnosis: Pulmonary congestion due to decompensated heart giving rise to hemoptysis and rales is often puzzling the clinician, as to whether the cardiac condition alone is present, or there is also a tubercular lesion. The x-ray examination is here a great aid. When due to congestion, we see the following (Fig.

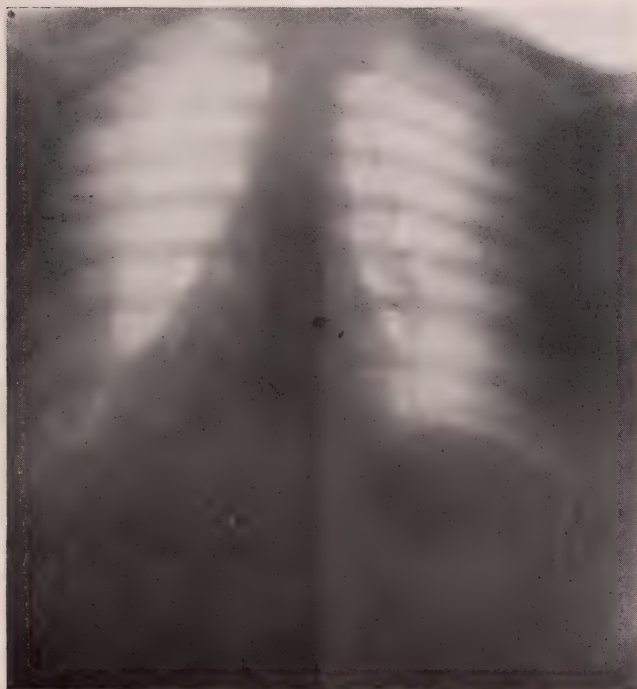


Fig. 1.—Ventriculo-dorsal position.

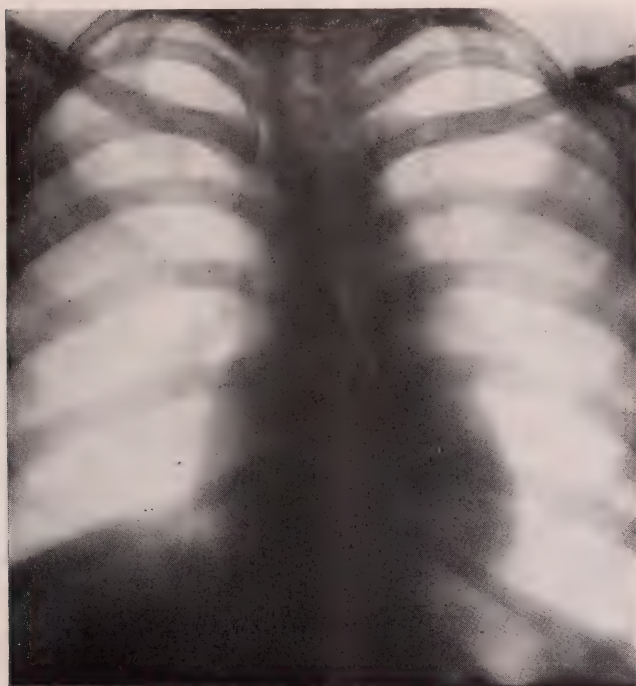


Fig. 2.—Dorso-ventral position.



Fig. 3.—First diagonal position.

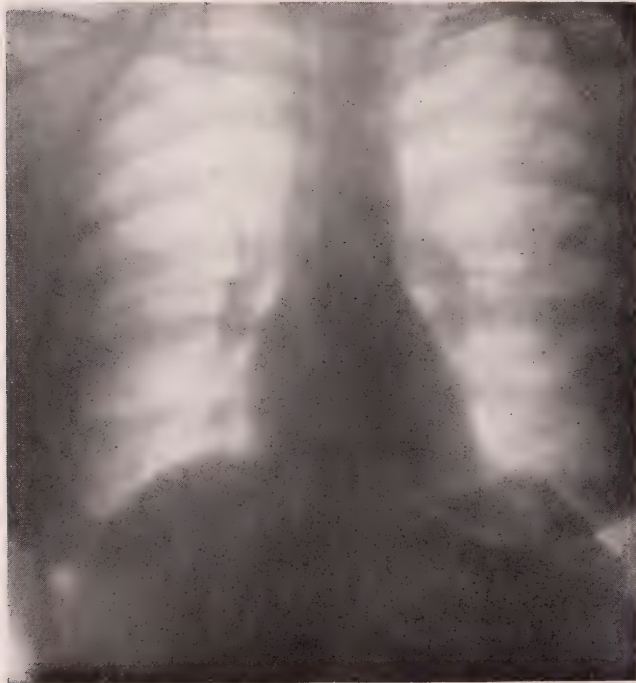


Fig. 4.—Healed tubercular lesion in the hilus.

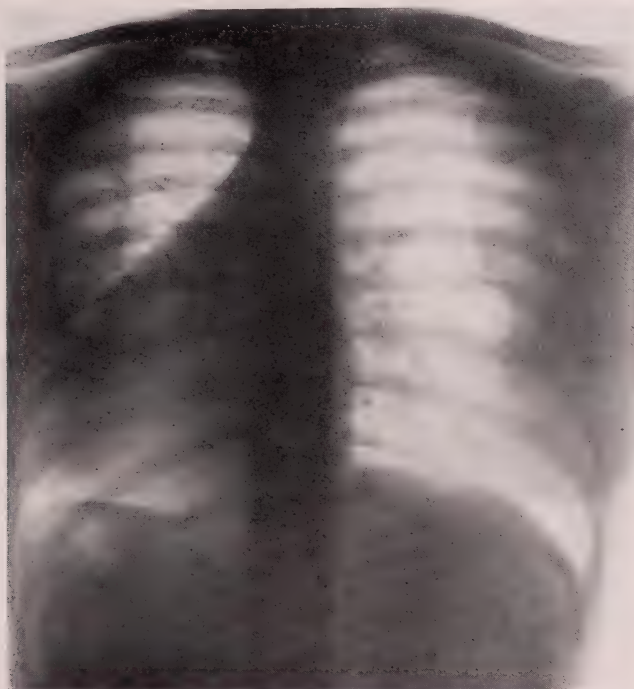


Fig. 5.—Ventro-dorsal.

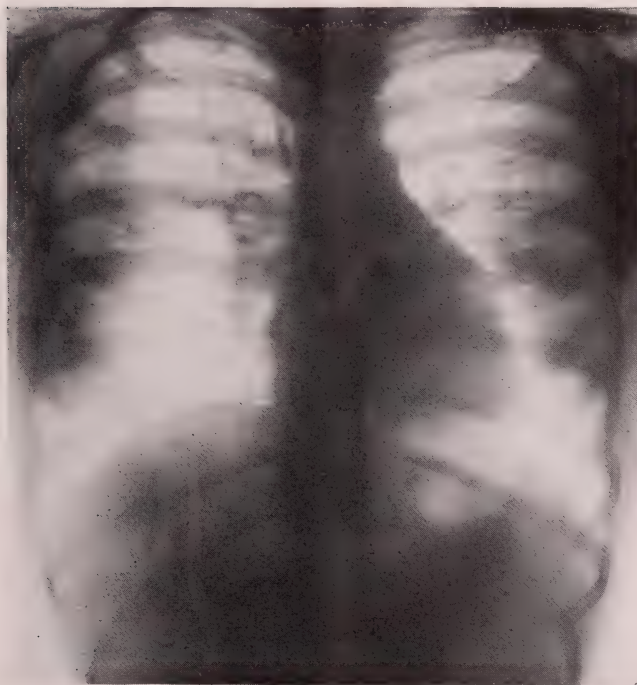


Fig. 6.—Dorso-ventral.



Fig. 7.—Decompensated ventral.

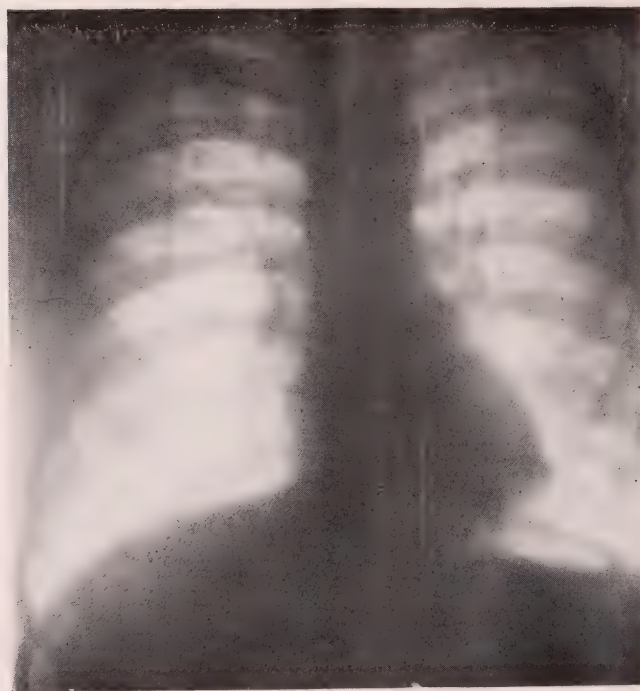


Fig. 8.—Left apical involvement.



Fig. 9.—Fibrosis of one lung.



Fig. 10.—Fibrosis of one lung.



Fig. 11.—Chronic disseminated tuberculosis.

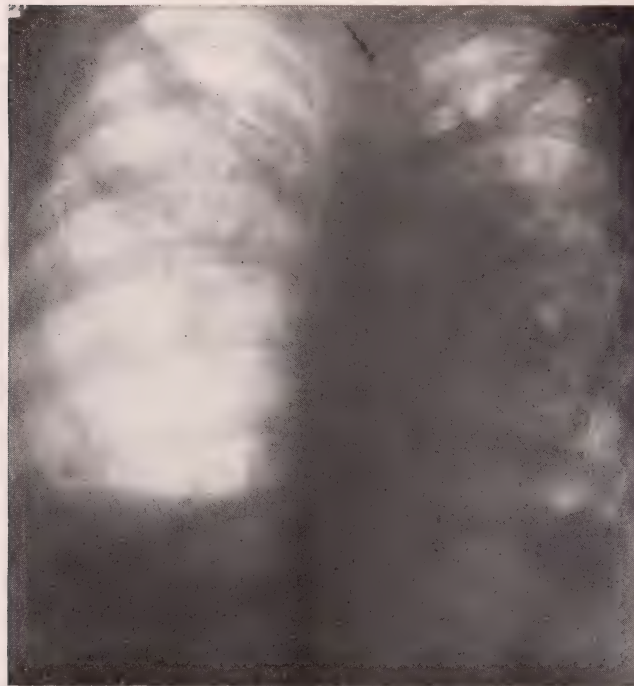


Fig. 12.—Chronic disseminated tuberculosis.



Fig. 13.—Healed apical tuberculosis.



Fig. 14.—Healed lung.



Fig. 15.—Pneumonia base.



Fig. 16.—Pleurisy with effusion.



Fig. 17.—Complete fibrosis.

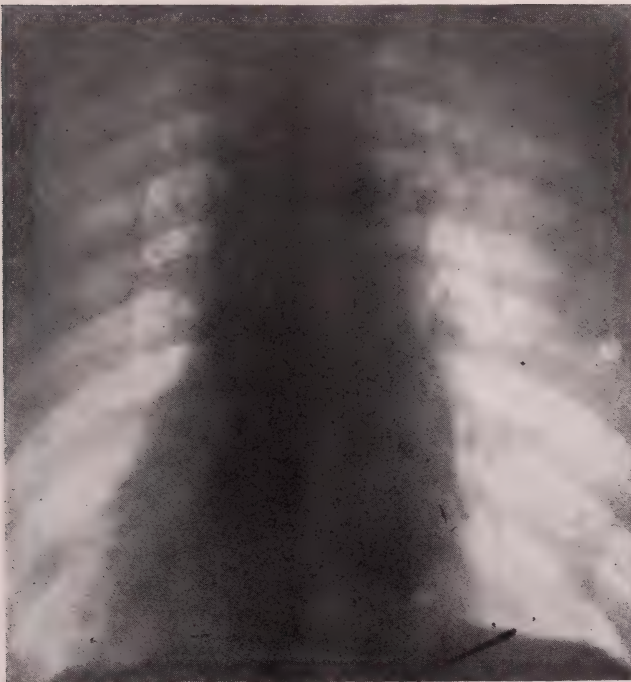


Fig. 18.—Ventro-dorsal emphysema with tuberculosis.



7): It is usually bilateral. The normal butterfly appearance of the hilus is effaced by the density of the shadows of the dilated blood vessels. The most marked shadows are external to the hilus and the linear markings are most marked at the bases. The apices are very clear. Often one base, mostly right, is veiled by a dense shadow due to an associated pleurisy or a more marked congestion of the lungs. Glands are as a rule not seen. In addition to that the characteristic appearance of the heart shadow the result of the valvular lesion and the x-ray signs of the decompensated heart, tend to clear up the diagnosis.

Tumors originating from the bronchi, or small tumors confined to the hilus, are differentiated from tuberculosis of the hilus by the fact that the former are much more marked by dense shadows irregular in outline, more on one side than on the other. A close study of the plates in such cases often discloses similar small shadows in other parts of the lungs due to metastasis.

Early apical tuberculosis (Fig. 8). In the study of the apices, fluoroscopy is indispensable. After thorough adaptation, the first fluoroscopic impression as to the difference in the shadow between the two apices is of paramount importance. The somewhat darker shadow of one apex often brightening up after prolonged fluoroscopy is of great diagnostic value. We have observed an additional phenomenon based on the same principle, that if we interrupt fluoroscopy, at each start the darker shadow appears again to disappear when illumination is prolonged. Such a shadow appearing over the left apex is even more significant. We are not aware whether any explanation has ever been offered for this phenomenon. It seems to us to be due to the fact that the air in the lungs being an excellent contrast makes even the slightest shadow visible. As such shadows are not due to complete obliteration of the alveoli, longer illumination makes the light zone cast by the air come out more pronounced and the shadows resulting from the limited infiltration disappear. The next point of importance is the persistent dark shadow, best studied by bordering off with a diaphragm. The cough phenomenon of Kreutzfuchs which means the clearing up of the shadow by coughing and forcible inspiration should be observed. If the shadow clears up less at one apex than at the opposite one, or it fails to clear up entirely, early apical tuberculosis is very suspicious. It cannot be too strongly emphasized that anatomical conditions and extrapulmonary diseases, or pathological respiratory lesions of a non-tubercular nature may cause apices to be shadowed. These must be mentioned and the points of differentiation discussed. Nasal obstruction retarding the entrance of air into the lungs, or pressure from without on either larynx, trachea, bronchi, or pulmonary tissues by substernal struma, thymus, enlarged glands, tumors, etc., cause collapse induration and shadowing of the apices.

Such are mostly bilateral, and intrathoracic causes of pressure can easily be seen. A unilateral shadow of the apex may be caused by pleuro-diaphragmatic adhesions. Here, too, the denser shadow at the base, the limited mobility and irregularity of the diaphragm tend to make the differential diagnosis. Collapsed induration if due to nasal obstruction usually throws a much denser shadow, more marked in the dorso-ventral than in the ventro-dorsal position, and the shadow terminates abruptly at the second rib.

Further evidence of early apical tuberculosis is afforded by the study of the sizes of both apices. Kroenig observed the phenomenon clinically that an infiltrated apex is narrower than a healthy one, an observation well confirmed by the x-ray. Small glands in the region of the apex, if present, strengthen the diagnosis. The calcification of the cartilage of the first rib and the small heart, at one time famous as a diagnostic feature in apical tuberculosis, are rightfully discredited by Dunham. An indispensable adjuvant in order to establish a positive diagnosis is the study of the lesion on x-ray plates in the dorso-ventral and ventro-dorsal position of the entire chest and apices. Small tubercular foci characterized by linear markings and slight mottling will be seen on the plate which could not be visualized fluoroscopically.

Just as important as the x-ray is in early pulmonary tuberculosis, it is equally valuable even in cases where the diagnosis is established by the other clinical methods. The well-known classification of pulmonary tuberculosis by Gerhard, Turban, and others depending on the amount of pathological involvement has rightfully been reversed by the ingenious studies of Peterson. He classifies and prognosticates cases depending on the symptoms and the general condition of the patient. Peterson's work has enlightened clinical facts somehow overlooked before, namely, that a patient presenting but few physical signs in the lungs may succumb because tubercles erode a larger-size blood vessel in the lungs and produce a fatal hemorrhage or sometimes by way of the circulation cause fatal tubercular meningitis or miliary tuberculosis, whereas patients with cavities in the lungs continue with little discomfort. An x-ray study of tubercular lungs aids often not only in the diagnosis but also in the prognosis. To illustrate: Two individuals present well-marked clinical signs, but from their symptomatic well-being are considered arrested cases, one of them as shown in Fig. 9 presents dense diffuse shadows over the greater part of one lung, the intercostal spaces considerably narrowed, rib markings less distinct than normal, the heart outline almost merges with the lung shadow, the hilus is obliterated (x-ray characteristic of fibrosis). The second lung if affected at all shows only signs of a healed apex, while the rest of the lung is unusually light with transversely running wide intercostal spaces and a more or less

flattened out diaphragm (compensatory emphysema). The second patient shows the affected side to consist of limited areas of fibrosis, cavities of various sizes, and areas of infiltration (Fig. 10). The first case, while subjectively more uncomfortable than the second, and has quantitatively more lung involved, is, from the standpoint of prognosis, more favorable. The lesion of the first case is practically walled off, so that autoinoculation or spreading by continuity is rendered less likely.

Tuberculosis of the lungs easily diagnosed by physical methods has often been shown by the x-ray to be far more advanced than the clinician has suspected. Small-sized cavities just below the clavicles or in the region of the hilus are often discovered by the x-ray in cases where the most expert clinician diagnosed incipient tuberculosis. We must emphasize again that dilated bronchi should not be confused with small cavities as is often done by the experienced. The former represent ring-like shadows, but with definite lung markings. While the latter shows a bright zone surrounded by a fibrous ring having a punched-out appearance. Cavities even the size of a pea can be diagnosed on a good radiograph.

Just as it is true that more involvement than clinically suspected is often discovered by x-ray, one may through wrong focusing pronounce more involvement than is really present. We only want to recall that the upper lobe of the lung in the mamillary line anteriorly reaches down to the fourth rib and posteriorly to the spine of the scapula. Realizing this and not neglecting to focus the tube in the dorso-ventral and ventro-dorsal positions as described above many mistakes will be avoided.

Chronic disseminated pulmonary tuberculosis with its varied pathological changes can be demonstrated on a x-ray plate. The accompanying illustrations (Figs. 11, 12) show a diffused shadow of the upper lobe (fibrosis) large, illuminating rings below, cavities and extreme thickening of the hilus. Thickened strands spreading from the hilus (peribronchial involvement) light grayish shadow following the outline of the lobe (caseation) irregular dome of the diaphragm (pleural adhesions) thickened tree-like strands running to the base (associated bronchitis). Very instructive and to be diagnosticated with a fair degree of certainty are the localized active and healed tubercular lesions. The active ones are characterized by a unilateral shadow of a part or the entire upper lobe which, however still, shows a moderate lightening up on coughing or deep inspiration fluoroscopically with well-marked outline of the ribs. On the plate mottled areas of various sizes depending on the coalescence of tubercles are seen. Caseous pneumonia usually involves an entire lobe, mostly upper and differs from lobar pneumonia in that the shadow is much lighter and coalesced tubercles of various sizes can be seen.

Localized healed tuberculosis is characterized by a dense shadow mostly unilateral invading in the greatest majority of cases the apex, the affected side appears much narrower than the healthy side (Fig. 13). The shadow is not influenced by coughing or respiration. The corresponding intercostal spaces of the ribs are narrowed while those immediately below wider and the lung shadows unusually light due to compensatory emphysema. When the fibrosis involves more lung (Fig. 14) and extends lower down, invading the surrounding pleura, the shadow is very dark, almost simulating fluid, the outline of the ribs is very much effaced, the intercostal spaces usually narrow, and neighboring structures, especially trachea and aorta, mediastinal structure are pulled to the affected side. In very chronic cases localized spinal curvature (scoliosis) with convexity to the affected side is met with.

The most important condition from which localized fibrosis is to be differentiated is pneumocoliosis, which is mostly bilateral, has no influence on the overlying intercostal spaces, has much more thickened lymphatic structure on both sides of the hilus, and does not displace surrounding organs.

Localized tuberculosis of the base of the lungs is a rare condition, so much so that a clinician like Richard Cabot with his wide clinical and pathological experience states that physical signs suggesting tuberculosis at the base should not be considered tuberculosis unless proved so by other evidence, whereas apical signs pointing to tuberculosis should be considered tubercular unless proved otherwise. However, localized tuberculosis of the lower lobe is occasionally met with either as a destructive, ulcerative form (cavity formation and caseation) or as a fibrosis of the entire lower lobe. According to Von Hanseman, who is an ardent supporter of the Freund theory, localized tuberculosis of the lower lobe is met with in individuals afflicted with a high degree of kypho-scoliosis of the dorso-lumbar region with a corresponding deformity of the chest. Local pressure interferes with the circulation of the underlying lung, causing disease. This condition when present in the ulcerative form, will readily be demonstrated by means of the x-ray by showing cavities and caseation. Fibrosis of a lower lobe must be differentiated from pneumonia, pleurisy with effusion, tumor of the lung and pleura, and pneumonia that has terminated in fibrosis. From pneumonia, the duration and clinical signs of the disease will establish proper diagnosis in most cases. From the x-ray standpoint, it differs from fibrosis by the somewhat brighter shadow, no displacement of surrounding organs, no change in the width of the intercostal spaces, usually there is a bright zone between diaphragm and affected lung (Fig. 15). Pleurisy with effusion if situated on the left side pushes the heart to the opposite side, whereas fibrosis pulls it to the affected side. The intercostal spaces

in effusion are not changed at all or slightly widened, whereas in fibrosis they are narrowed. The diaphragm in an effusion is pushed down and the p.p. and p.c. angles are obliterated. In fibrosis the diaphragm is irregular and pushed upwards. When pleura-diaphragmatic adhesions exist, mobility of the diaphragm may be entirely lost, or the see-saw movements are observed (one dome moving up while the second moves down on respiration). The characteristic horizontal line, with its concavity upward in the vertical position, moving upwards in the horizontal position is most characteristic of an effusion (Fig. 16).

Complete fibrosis of the lower lobe is differentiated from tumor of the lung and pleura by the latter being much more irregular and the greatest density of the shadow is in the region of the hilus, the diaphragm, and intercostal spaces are unaffected. From fibrous pneumonia a differential diagnosis by means of x-ray is impossible.

Complete fibrosis of all the lobes (Fig. 17) of one side is characterized by a uniformly dark shadow, pulling of trachea and mediastinal structures to affected side, effacement of the heart shadow if on the left side. Extreme narrowing of intercostal spaces so the ribs almost overlie one another and their curves can hardly be differentiated. The diaphragm is usually immobile or obliterated. Marked compensatory emphysema of the opposite lung exists.

The aid of the x-ray in bronchopneumonic phthisis is usually of secondary importance as the clinical signs are sufficient to establish a diagnosis. If called on to diagnose, it is to be differentiated from bronchopneumonia by the fact that the affected areas are much larger in size, more irregular and the shadows are grayish on account of the caseation. There is also a marked thickening of the hilus.

Miliary tuberculosis of the lungs is readily diagnosed on the x-ray plate by the characteristic pearl-like shadows and very fine scattered mottling throughout the lungs. X-ray diagnosis in miliary tuberculosis of the lungs deserves special appreciation as it is well known how difficult clinical diagnosis often is.

In the following conditions the x-ray is almost irreplaceable as a conclusive diagnostic aid.

Localized Pneumothorax.—We are well aware that the trained clinician will diagnose the condition by physical signs. We have seen cases where dilated bronchi, large size cavities, and marked localized compensatory emphysema were mistaken for localized pneumothorax. On the other hand, localized pneumothorax was diagnosed clinically, where the x-ray showed characteristic cavities. The typical x-ray appearance of the localized pneumothorax with the extreme bright shadow, widening of the intercostal spaces, absence of lung markings and the stripe of compressed lung towards the median line leaves no doubt as to the diagnosis.

Chronic emphysema complicated by pulmonary tuberculosis is clinically often impossible to diagnose, whereas the diagnosis by the x-ray is absolutely decisive (Fig. 17). Besides the emphysema, mottling of the different parts of the lung, very thickened hilus, and thickened strands extending to the periphery are seen.

Senile changes in the lungs with loss of elasticity in the alveoli with associated bronchitis and atelectasis make the differentiated diagnosis of this condition from chronic pulmonary tuberculosis sometimes very difficult. The x-ray shows a denser shadow than normal of both lungs, but shadows characteristic of tubercular lesions are missing.

Indications for the production of artificial pneumothorax in the treatment of tuberculosis can be established with ease by means of the x-ray. The demand that one lung must be entirely healthy or at its most, according to Albert Frankel, have only the apex involved on the healthier side, can best be demonstrated on x-ray plates. Furthermore, for a successful therapeutic pneumothorax no bands of pleuritic adhesions should exist—a condition easily demonstrated by the x-ray. Finally, the x-ray serves to control the success of a pneumothorax and to decide when a refilling is necessary.

Catarrhal condition of the lungs, especially when confined to the apices which when following influenza so frequently have a tendency to persist are often of considerable concern to the clinician. Negative sputum examinations are not conclusive. Tuberculin tests (subcutaneous) are not applicable because of the febrile state of the patient, the von Pirquet is of no diagnostic value in the adult, and the value of the complement fixation in tuberculosis is still unsettled. A negative x-ray finding in such cases excludes every doubt.

Thus far outspoken lesions of pulmonary tuberculosis of a lesser or greater degree have been briefly sketched. We feel, however, that a few remarks on the status asthenicus (Stiller) and status thymo-lymphaticus (Paltauf-Escheich) or exudative diathesis (Czerny).

Habitus asthenicus.—It has long been known that this status with the long paralytic chest, with the narrowed aperture, calcified first rib, floating tenth rib, increased Lennhoff index with the long vertical small heart (Tropfenherz) predisposes to apical tuberculosis. Such a status, before the x-ray era, was only recognized when the external landmarks were evident. By the aid of the x-ray such a status is often enough met with in individuals in whom fair muscular development effaces the status to a considerable degree. The credit of having brought this important subject to light

is rightfully due to Friedrich Kraus. Knowing that such status predisposes to all kinds of chest and intraabdominal disorders, the x-ray has been of immense aid prophylactically and therapeutically. As far as pulmonary tuberculosis is concerned, the discovery of such habitus with indefinite clinical symptoms such as evening rise of temperature, indisposition, should awaken a strong suspicion even without any demonstrative lesion in the apex and cause us to act prophylactically.

Status Thymico-Lymphaticus.—To this field Neusser, Kraus, Czerny, and E. D. Friedman have contributed most valuable literature. The above named clinicians and the pathological studies of Ghon have demonstrated beyond doubt the existence of active and latent tuberculosis in the lymphatic glands of the chest without any involvement of the lung parenchyma. Ghon showed that the adjacent pleura and pericardium are often involved which during life give rise to indefinite chest pains and cardiac disturbances. The demonstration of such glands and the pleura pericardiac adhesions by means of the x-ray make the diagnosis accessible. With the existence of such gland and a more or less thickened hilus, additional clinical symptoms are sufficient evidence that latent tubercular glands are becoming active. In children it is of particular value, as we often find that a thickened hilus with enlarged tracheal and bronchial glands are explanations for an anemia, lack of development, and frequent rise in temperature.

SUMMARY.

An effort has been made to impress again the importance of the x-ray in the diagnosis of pulmonary tuberculosis. It was shown that it is of decided value in early and advanced tuberculosis from the diagnostic and prognostic standpoint.

For the diagnosis of tuberculosis of the hilus, tuberculosis complicating chronic emphysema, for the indications and results of a therapeutic artificial pneumothorax, the x-ray supercedes all methods of diagnosis.

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**CAUSE AND CURE OF PROCTITIS, PRURITUS ANI, SCROTI,
AND VULVAE.***

By ALCINOUS B. JAMISON, M.D., New York.

A quarter of a century has passed since I discovered the cause of pruritus ani, etc., to be a secondary symptom of chronic proctitis. The primary symptoms are submucous, subtegumentary, and supermuscular mucous channels, the result of inflammatory exudates from the diseased organs and the walls of the mucous channels as they invade healthy tissue.

All cases of chronic proctitis have more or less development of mucous channels and of periproctitis, which are the result of the invasion of mucous channels into the perirectal connective and fatty tissues around the rectum and the lower portion of the sigmoid colon.

Some of my readers may desire to know how I made the discovery of the pathological condition that causes pruritus ani. For a time I had succeeded in relieving the very distressing symptom by treating piles and the mucocutaneous sacs around the anal vent with local remedies and hot sitz baths. But the results were not entirely satisfactory, and I knew that I was not doing the right thing, at the right time, nor in the right way, so discontented, I was on the constant lookout, determined to know the why and wherefore of the itching, regardless of what the ancestral, embalmed, commercial authors had said on the subject.

While treating a patient, I observed circular, denuded patches here and there on the skin of the buttocks, the result of scratching, and it occurred to me that while I could see the outer surface of the abrasion, that which lay beneath was not visible. A bistoury was passed through the tissue of the raw, circular patch until I felt a cavity, then a probe was inserted under the integument for about two inches before it reached the anus, and thus the cause of pruritus ani was made plain. A few days after this incident I had occasion to dilate the sphincter muscles of a patient who suffered from itching around the anal vent. The skin and mucous membrane had become cicatricial and brittle and cracked in some dozen or more places around the anus, and it appeared that each one of the splits was in the wall of a submucocutaneous channel. After the dilatation of the anal sphincters, ecchymosis and puffiness may occur, indicating the presence of a mucous cavity or a channel extending away in some direction from the anus.

*Read at the tenth annual meeting of the Association of Proctogastroenterologists.

I needed no further evidence of the existence of subtegumentary and submucous channels, except to find how deep, numerous and extensive their excursion might be into the neighboring tissues and organs.

It is a serious pathological condition to have the pelvic organs and a portion of the walls so invaded by symptoms of a chronic disease, and especially by its primary symptoms, for these are very destructive and disturbing to their functions and to the whole system as well.

The inflammatory exudates from subtegumentary and supermuscular mucous channels, extending from the anus back on the posterior raphe and on either side, may exude in some cases through the skin, causing itching of an indescribable torture, searing the tissues to the extent of forming cicatricial tissue of the skin; also of the fatty tissue under it, which sometimes serves as a wall between the subtegumentary and a supermuscular channel, forming thus a double subway for quite a distance. All this is due to the local effect of the inflammation and its ichorous exudation. Then why not pruritus recti, etc., as the same chronic pathological conditions exist in the diseased bowels in and under the mucous membrane, which also becomes cicatricial like the integument and fat under it? Also why not pruritus systemicus; the whole body itching—called nervousness?

In the anterior raphe in the male the mucous channels are supermuscular and divide into branches passing along the upper portion of the thighs, over the serous membrane of the scrotum and may extend far above the pubic arch. The mucous channels that pass through the anterior raphe of the female are very deep and more difficult to follow than in the male. Near the anus the mucous channel may penetrate between the muscular layers and pass forward to the region of the bladder, as well as into the connective tissue and space between the rectum and the genitourinary organs. In addition to the local and systemic disturbance from the numerous mucous channels that cause the invaded region to somewhat resemble a sponge, we have a great quantity of noxious exudation from all the diseased regions absorbed into the system, searing, contracting, pinching and twisting the nerves to such an extent that normal rest and sleep is unknown, and the chronic sufferer is called a neurasthenic. Then why not pruritus neurastheni? The whole body itching, contracting, with general soreness, pains and exhaustion, causing depression and weariness of mind and body beyond human endurance.

When these facts are recognized by authors on digestive, nervous, mental, uterine and genitourinary troubles, it will mark a new era in the history of medical literature on numerous subjects of systemic and mental ailments. Even if the pruritus symptoms are not present, moisture may be observed on the integument, and

if not at the time of examination, we find great nervous disturbance locally and throughout the body.

Pruritus ani is only one of many very annoying symptoms of proctitis and sigmoiditis for which the coccyx, uterus, ovaries, and appendix are removed, and operations for supposed tumor are performed; also exploratory abdominal operations are frequently made by those incapable of making a proper diagnosis of the case. Contemplate for a few moments the gravity of a disease misunderstood by medical men the world over! They have resorted to all sorts of makeshift treatment of its numerous symptoms, the causes of which were beyond their ken.

I will enumerate briefly the various pathological conditions that but few, if any, escape from early infancy owing to the ever-present toxic diaper; and during later years the inflammation extends until we find chronic proctitis, periproctitis, sigmoiditis, perisigmoiditis, numerous mucous channels extending to other organs and neighboring tissues, and pouring out great quantities of ichorous exudates, which are absorbed into the system, also discharged through the skin and the mucous membrane of the lower bowels; these exudates being very tenacious, holding fast to the mucous membrane of the diseased bowels, and causing what I choose to call a "mucous storm" as the chronic inflammation becomes acute. During this time the bodily and mental symptoms are very prostrating until the collected mucus can be cleared away, when the patient is relieved. Is not such a serious pathological condition of the lower bowels, with its symptoms, worth taking into consideration, when the cause of bodily symptoms is being sought?

When chronic inflammation has penetrated through the mucous membrane of the rectum, etc., and invades the connective and areolar tissues, its exudates destroy the delicate tissues (as would pus), forming mucous channels and cavities which slowly burrow their way like a pus fistula, down and over the anal muscular tissue and into the connective and fatty tissues under the skin, whence its excursions extend in many directions. The manner in which these mucous fistulae or channels extend through connective and fatty tissues is very interesting.

The channels when opened are empty, and induration in surrounding tissues may occur and pass away occurring again at some future time with pus formation in a section of the lengthy tube. Continuous pressure does not seemingly enter into the excursion of mucous channels, yet their course is quite distinct and can be followed by a probe slightly bent near the end, for six, ten, or more inches. Mucous pressure may be periodical, when the chronic inflammation becomes acute, followed by a great amount of exudation (as we find it discharged upon the mucous membrane of the diseased organs) and this pressure extends the mucous channel

until it has had time to be absorbed into the system, when a halt occurs until another mucous storm occurs, causing the invasion of more healthy tissue. Extensive mucous exudation takes place from the walls of the long mucous channels, which alone might be sufficient to continue their excursion. The reader may think, as others have remarked, that it is easy to put a probe anywhere in the tissues; it is very easy to make the suggestion, but let them try it on a patient without local or general anesthesia.

For the past three years a few proctologists have been trying to cure pruritus ani, etc., by vaccine treatment—some good will come from their efforts in determining the character of the chronic inflammatory exudates found upon the skin around and near the anal vent. As long as they do not use a bistoury as I did, they will think I have had a very vivid imagination for the past twenty-five years!

My diagnosis of pruritus ani, etc., being correct, it was a very simple matter to devise the proper and effective treatment, by the ambulant method, for a disease and its primary and secondary symptoms, hitherto neglected through ignorance of its existence and its gravity locally, bodily, and mentally.

To cure proctitis and sigmoiditis, cleanliness of the large intestines is very essential, and I accordingly devised for this purpose a reservoir holding three gallons of water, an ample amount of water to secure the hygienic results desired, while sitting on a toilet seat. The accompanying illustration will give a good idea of the author's apparatus for flushing the large intestine. The water used for the cleansing is at a temperature of 100°, 105°, or 110°, medicated with oil or other remedies, as desired. This depurant attention should be accomplished twice or three times a day, with care that no tenacious ichorous mucus and foul feces and gases remain to disturb the functions of the intestines, as well as the mind and body.

Cleanliness of the bowels will permit the use of a long speculum for local treatment of granular and ulcerated areas along the diseased organs without any annoyance; also the desired results from the use twice daily of depurant and antiphlogistic remedies. My device for the flushing of the large intestine has another very important use in the cure of proctitis, by the very convenient and proper application, in the intestine, of medicated water, at the temperature of 125°, 135°, even to 150° (as the case may require) which is continued for one hour or more, once or twice a day. It is really a combined internal Turkish and Russian bath, with wonderful psychophysical results, bringing about the normal functioning of all the organs of the body and mind.

For more than three decades I have thoroughly appreciated the valuable depurant results from flushing the large intestine, and

the antiphlogistic benefits derived from the use of water at a temperature of 125°, 135°, or 150°, but the lack of time and a retiring disposition have delayed the announcement of such a valuable means of treatment.

I have briefly outlined the treatment of the cause of mucous channels or subways, that connect various organs and tissues without external entrance or exit to their traffic or trouble. In some cases the volcanic lava streams beneath inflame, parch, pain, and itch the mucous membrane and skin covering them, as a warning of trouble below; and as the pent-up fire and its exudates go from bad to worse pus may accumulate until an exit must occur. No need of all this local and systemic warning and pus eruption; as the diagnosis and prognosis can be made early in the inception of the disease and future trouble be averted.

To properly treat the various mucous channels in the perirectal and other regions, a slight opening is made here and there through the skin into the channels, that they may be properly irrigated until healed.

If the lower bowels of men were kept in a normal state of function from birth through life, the world would be inhabited by a new race of people, with high purposes and ideals of life, fit companions for the gods and goddesses.

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PROGRESSIVE SPINAL MUSCULAR ATROPHY.

BY WILLIAM H. DEADERICK, M.D., Hot Springs, Ark.

Progressive muscular atrophy is characterized clinically by muscular wasting in groups, fibrillary tremors, diminished or absent reflexes, and the absence of changes in sensation. The disease was first described by Sir Charles Bell in 1836. In 1849 Duchenne published a paper upon the subject and in 1850 Aran reported eleven cases. This form of atrophy is sometimes known as the Duchenne-Aran type.

No race seems particularly predisposed to spinal muscular atrophy. Males are more frequently attacked than females. The disease is one of adult life, occurring infrequently before the age of twenty-five. Many cases give a history of some nervous disease in the family. Chilling, trauma, infections, worry, strain, pregnancy, and sexual excesses are mentioned as predisposing causes. Diabetes precedes a few cases and syphilis coexists in some instances, as in one of my cases reported below.

The essential pathologic change is a chronic anterior poliomyelitis with degeneration of the nerve cells of the anterior horns of the gray matter. The cervical portion of the cord is especially involved. The anterior nerve roots are smaller than normal and degenerated. The first sign of the approach of the disease is usually weakness of certain muscle groups, particularly of one hand. Atrophy begins gradually and follows closely upon weakness. From the hand the changes usually proceed to the forearm, arm, and shoulder girdle. The disease may begin upon one side before the other is affected and may progress more rapidly in one limb, but is always bilateral and generally symmetrical.

The weakness and atrophy may begin in the legs and extend to the thighs as in the upper limbs. Wherever the origin it is usually the distal portions of the limbs which are first involved. If the disease begins in the legs awkward gait or stumbling may be the first evidences of trouble. The facial muscles are occasionally atrophied. Sensation is normal and the sphincters are not involved. Sexual power is diminished or lost in some instances.

The electrical changes in the muscles consist of a partial reaction of degeneration. Fibrillary tremors in the muscles involved are the rule before the atrophy has progressed too far and constitute a very important symptom. Pain is not a part of progressive muscular atrophy, but there may be a sense of intense muscular fatigue. Weakness and awkwardness are the most fre-

quent subjective complaints. The living skeletons of dime museums are usually victims of progressive muscular atrophy.

The chief diagnostic features of the disease are the age of onset, the atrophy progressing from the distal to the proximal portions of the limbs, fibrillary tremors, and the diminished or absent tendon reflexes. The disease is distinguished from progressive muscular dystrophy by the presence of fibrillary contractions, and from amyotrophic lateral sclerosis by the diminished or absent tendon reflexes.

The following table may make the characteristic features more clear:

Progressive Spinal Muscular Atrophy. (Duchenne-Aran).—Symptoms usually appear in middle life. Atrophy usually begins in distal portions of limbs. Fibrillary tremors common. Reflexes diminished or lost.

Progressive Muscular Dystrophy.—Early age of onset (early childhood). Atrophy beginning in proximal portions of limbs and trunk. Fibrillary tremors absent. Reflexes diminished or lost.

Amyotrophic Lateral Sclerosis.—A disease of middle life. Atrophy and weakness usually begin in the hands, may commence in the feet. Fibrillary tremors common. Exaggeration of tendon reflexes.

Progressive Neural Muscular Atrophy (Charcot-Marie-Tooth).—Usually begins before age of 21 and may show a family tendency. Atrophy limited to peripheral parts of limbs. Fibrillary contractions common. Tendon reflexes lost.

The prognosis is uniformly bad. The disease may prove fatal in a few months from involvement of muscles of vital function or from intercurrent disease or may last fifteen years.

Treatment of the disease itself is of little avail. Electricity, massage, and hydrotherapy may be tried. Patients with diabetes should be placed upon appropriate diet, and those with syphilis should have specific medication.

The two cases reported recently appeared in my service at the Clinic of the Government Free Bath House.

CASE I.

I. P., native of Florida, colored, male, aged 33, married, occupation cook. Examined June 30, 1916. His father is living and well at 82; his mother died at 70, cause unknown; she was subject to rheumatism. Two brothers died violent deaths and four brothers and a sister died in infancy. At the age of 10 or 12 he had a severe attack of measles, and, on getting out, while he could see well during the day, after sun-down shadows came before the eyes and the vision was totally lost until the next morning. This persisted for two or three months, then disappeared entirely. Four or five years later the same trouble reappeared and lasted two or three months, since when it has not reappeared. Between the ages of 17 and 18 a pain appeared in the small of the back which became so severe that he was confined to the bed for five or six months and was not able to do any work for five years. Before being taken

sick he weighed 160 pounds. For the next eight years he worked in the turpentine industry. He has one healthy child nine-years old. About eight years ago he became weak and awkward, had to give up work, and has been getting progressively weaker and thinner. The tremors began about seven or eight years ago. His present complaint is weakness and clumsiness. He thinks the sexual power is increased. He has muscular tremors at times, night before having noticed this symptom. His present weight is 112; the muscular structure is generally atrophic, particularly of the shoulders and thighs. His gait is of a peculiar waddling character. The facial muscles are slightly atrophied. The pulse is 110, regular, and the radials and brachials are palpable. The blood pressure is 120 systolic, 85 diastolic; the apex beat is in the fifth interspace in the nipple line, and the heart sounds are negative; cog wheel inspiration is heard in the apices of both lungs. The liver dullness is diminished; there is a quivering of the hands and leg. The abdomen has a peculiar nodular feel; he is markedly sway-backed; both legs from the knees down present numerous scars. The knee jerks are gone, the plantar reflex is normal, there is no clonus and no Babinski. The arm and wrist jerks are diminished; he has fair power in the extensors of both arms; flexion is impaired, but about symmetrical; in the legs flexion is stronger than extension; in the feet flexion is good, extension weak. The epitrochlears and inguinals are enlarged; the cervicals negative. The Romberg is negative, and the pupils are equal and respond to light. The mucous membrane of the mouth is blue; several teeth are carious. The urine, stained blood film, and Wassermann are negative. The treatment consisted of the Hot Springs baths and the iodides. He left for home in six weeks feeling stronger, but with no radical improvement.

CASE II.

W. E. J., native of Arkansas, white, male, aged 26, occupation laborer, examined May 27, 1916. The family history is negative. He had congestive chills at 14, and at 21; chills and fever in the summer of 1914. There is no venereal history. He was strong as a child and youth and there is no history of trauma. There has never been any muscular hypertrophy. Four years ago he noticed that when he started to run he would have a catch in the hips and legs and fall. Paralysis started in both legs symmetrically about a year after the catch began and seemed to work up the spine and back; the arms became weak about the same time. He had a diarrhoea of four days' duration when the trouble first started. The wasting started in the adductors of the thigh four years ago, then in the other muscles of the legs, then the humeral muscles and finally the back. For the first three years he did not sleep well. At the beginning of the disease he weighed 155. Four years ago the muscles, beginning in the legs, began to quiver when he exerted himself. His present complaint is that the stomach is disordered, he has no strength and is "paralyzed" all over. He had no pains until four or five days ago when they appeared in the arms and legs. The appetite is irregular, the digestion bad, and the bowels are constipated; for the past year he has been sleeping well. Bowel and bladder control are normal and the sexual power is increased. The muscles quiver all over upon exertion. His present weight is 115 pounds, the height about 5 ft. 11 in. He is very much emaciated. The scapular and pectoral muscles are particularly atrophied and the scapulae present the typical alar type. The genitals are atrophied. The facial muscles are normal. The pulse is 78, regular, the radials and brachials are palpable; the blood pressure is 140 systolic, 85 diastolic. The chest is negative, the abdomen tender in the iliac region. The achilles is greatly increased, the knee jerks sluggish and the arm and wrist jerks slightly diminished. There is no clonus, no plantar reflex, and no Babinski. There is very little power in the flexors of the arm; the

extensors are good. Muscular power in the legs is greatly impaired, particularly in the flexors. The grip in the left hand is 16 K., in the right 11 K. The pupils are normal. The patient is too weak to stand for the Romberg test. He climbs down his legs to pick up an object from the floor and climbs back up again. The gait is waddling. There is no sensory disturbance, there are no tender nerve trunks, and the temperature sense is normal. The hemoglobin is 70 percent, stained blood film and urine negative and the Wassermann four plus. He could not be convinced that he had syphilis and refused treatment.

PRURITUS ANI—ITS ETIOLOGY AND TREATMENT.*

A Seventh Report, Based on Results of Original Research.

By DWIGHT H. MURRAY, M.D., F.A.C.S., Syracuse, N. Y.

In making this my seventh annual report on original research work in pruritus ani, scroti, and vulvæ, to the American Proctologic Society, I can report good progress and some vicissitudes that have been gone through during the year.

I am pleased to report that during the past two years several other physicians throughout the country have been interested in the work and according to their reports have been uniformly successful, which is quite gratifying to me and my coworkers. Dr. Hirschmann and Parke, Davis & Co. have continued their work and at my suggestion Parke, Davis & Co. have made a polyvalent vaccine composed of streptococcus fecalis of eight different strains taken from eight patients. The vaccine is standardized at three billion dead bacteria per cubic centimeter and while not yet ready for marketing they have just begun to furnish me with some of it for the purpose of testing it out and comparing the results of this with that of the autogenous vaccine. I am sorry that I cannot make a more complete report of the use of stock vaccine at this time, but I received the first shipment about May 1 of this year and I have not yet used it long enough to be able to say definitely about comparative results, but I am willing to say that so far as we have used it the results of individual doses seem to be very encouraging and I sincerely hope that we will have a product that can be put to general use. If this proves to be so it will save a great deal of trouble for the general profession throughout the country, particularly in out of the way places where bacteriologists are almost unheard of, it will also save a great deal of hit and miss work of the physicians and bacteriologists who are not able to understand the method of doing the work or of proving the identity of streptococcus fecalis.

One great advantage that can come from this, is that we may get a much more uniform product and results than with vaccines that are made up directly from cultures and of varying strengths. It may also do away with our being disappointed by vaccines supposed to have been correctly made but through some fault in the media or a misunderstanding of technic by the bacteriologist the vaccine was not of uniform strength or that its virtue may have been lost by killing the bacteria with heat.

*Read at the nineteenth annual meeting of the American Proctologic Society.

During all of the past years of this research work our bacteriologist has had trouble in getting vaccines to measure up to the strength that I believe to be necessary for good results. Recently they have found that by using a different media, beef bouillon, that he can get streptococcus fecalis to grow much more luxuriantly, and within the past two weeks has told me that he can now make the vaccines of almost any usable strength, this is of so recent development that I cannot say much about it at the present time and promise a later report.

In my report of last year I stated that for some reason the patients all seemed to get worse at about the same time notwithstanding a large increase in the dosage and the explanation was, that the vaccine had been reduced in strength from one thousand million to two hundred million dead germs to the cubic centimeter without my knowledge. When I called the bacteriologist's attention to the fact that I must have strong vaccine they increased the strength to between eight hundred and fifty million and thirteen hundred million to the cubic centimeter and all of the patients immediately began to improve.

During a part of the past year we have had trouble in getting active vaccine; in some instances it seemed to be inert and I must caution those who do this bacteriologic work against killing the bacteria by heat as it is practically impossible to bring the heat to exactly the same point in all parts of the specimen and to prevent a little higher degree than it was intended, thereby rendering the whole product inert. Instead of using any heat at all I believe the best results will be obtained by using one-half of one percent phenol or three-tenths of one percent of trikresol for the killing of the bacteria. This may take a little longer and require greater care in final testing, but the results will pay for the additional time and trouble.

It seems unnecessary to give this year's report in as great detail as to the bacteriology and the results of treatment with proper vaccines as has been done in the past six reports because I find that the cases are running quite uniformly alike as they have done in the past. The bacteriology proves the same in the twenty additional cases this year and outside of the variations and the unfortunate occurrences herein reported we have had continued success in the treatment of pruritus ani and vulvae with autogenous vaccines. There seems to be little doubt that if we could have had vaccines of standard strength for use in each case the success of the treatment would have been more satisfactory.

There have been times during the past six years when for some months the action of the vaccines would be almost marvelous in its results and at other times for months we would get almost no results. This probably was due to the changes that have occurred

in the personnel of the laboratory which made it more or less of a hit and miss work so far as the bacteriology was concerned.

This was never proved to me more strongly than during the past year when suddenly every patient seemed to be relapsing with increasing dosage of vaccine. Shortly after this I returned eight or ten of the "strong" vaccines to the laboratory to be checked up and also sent samples of the same to Mr. H. C. Ward of the Parke, Davis & Co. laboratory, so that he might check up, not only on the strength but the bacteriologic purity of the vaccine. I received a report from our own laboratory and that of Parke, Davis & Co. that the vaccines were not only much lower in the reported number of bacteria to the cubic centimeter but that eight of the twelve samples submitted (all having been made by the same laboratory worker) that were labeled streptococcus fecalis contained none, but that they did contain all sorts of germs. This was a great shock to me and caused trouble among my pruritus ani patients, but I believe that it was not without value in a negative sense, to-wit: It gave me proof of the fact that we must have vaccine made from the correct bacteria and of proper strength in order that results may be obtained.

During the time the vaccines were wrong the patients relapsed from the benefit they had received during the use of proper vaccines. This coupled with the fact that when we had honest work in the laboratory with proper vaccine we were getting uniformly good results, gives additional proof of the correctness of our past claims for the etiology of pruritus ani.

CASE REPORTS.

CASE 124.

June 5, 1916. Mr. E., aged 47. Has had pruritus ani for about three years. Itching awakens him at night, also bothers him in the daytime. Cultures showed streptococcus fecalis.

Examination showed a small complete fistula posterior center, this I operated under local anesthetic. Patient was given six injections of autogenous vaccine, when he reported there was no itching and he has not been troubled since that time.

CASE 125.

July 12, 1916. Mr. C., aged 35. Factory superintendent. Had what he called itching and chafing for the past three years growing gradually worse, is awakened at night scratching and continues it until the tissues are raw and sore, itches in the daytime and says it seems as though he would go wild.

Examination shows skin macerated and in folds with loss of pigment. Cultures taken and streptococcus fecalis reported. No internal hemorrhoids, two diseased crypts. Patient not treated.

CASE 126.

August, 1916. Mr. N., aged 45. Superintendent. Has had pruritus ani for fourteen years and has gradually grown worse, says that if his general health is bad his itching is worse.

Examination shows skin macerated one and one-fourth inches all about

the anus. Speculum shows very small internal hemorrhoids not inflamed, no diseased crypts or hypertrophied papules. Cultures taken and streptococcus fecalis was found. Vaccine was made and twelve treatments were given. This case was one where our bacteriologist purported to give me a vaccine with 5,000,000,000 dead germs to 1 c.cm. and on the twelfth injection I gave 100 minims of this vaccine and no reaction followed. This was the first case that really confirmed my suspicions that the vaccine was not what it was purported to be. I sent it back to the bacteriologist who made it telling him that something must be wrong, but he assured me that the strength was as it was first reported and that it was a streptococcus fecalis vaccine. This vaccine was sent to Parke, Davis & Co. for verification, they reported that it was not the strength purported to be and that there were very few streptococci in it. The vaccine was made to look heavy by the addition of other bacteria. This patient did not receive benefit and discontinued his treatments. After I found out what the real trouble with the vaccine was I notified him and expect him to resume treatments later.

CASE 127.

September 27, 1916. Dr. I. Patient complains of a diarrhea, also troubled with pruritus ani for ten years. Had diarrhea for two years, has loose watery discharges and sometimes bleeding, usually has two watery stools in the morning, has intense pruritus at bedtime and sometimes in the night, occasionally in the daytime.

Examination shows sphincter normal, external skin is redundant, speculum shows good sized internal hemorrhoids, prostate slightly enlarged. Proctoscope shows subacute proctitis. A small polyp was found at the entrance to the sigmoid, this was removed and sent for pathological examination and reported to be a benign growth. Culture from anal skin was positive for streptococcus fecalis. Patient not treated.

CASE 128.

October 9, 1916. Mr. S. Librarian. Has had pruritus ani for the past sixteen years.

Examination shows skin badly fissured, macerated and swollen for one and one-half inches outside the anus. Sphincter normal. Speculum shows some moderate sized internal hemorrhoids not inflamed. Culture was positive for streptococcus fecalis. Urine showed indican four plus. This patient was given twelve treatments without benefit and his vaccine proved to be the same quality as Case 126.

CASE 129.

October 11, 1916. Dr. L., aged 44. Has had pruritus ani for the past three years, usually at bedtime. Skin almost normal in appearance. Cultures were taken in this case one year ago and reported negative and at the present time it is positive for streptococcus fecalis. Patient took eleven treatments and the itching was very much better though not entirely relieved.

CASE 130.

October 14, 1916. Mr. G. Clerk. Has had pruritus ani for the past forty years gradually growing worse. Not constipated. Two weeks ago had a very active dermatitis involving the scrotum, groins and penis all of the locations itched very markedly. Sphincter normal, no internal hemorrhoids, prostate slightly enlarged. Cultures were positive for streptococcus fecalis. This patient was treated during the time we had trouble with the vaccines. He had twenty-eight treatments and discontinued slightly improved.

CASE 131.

November 2, 1916. Mr. B. Mechanic. Constipated for six months. Pruritus ani began about three months ago. It is very severe, begins at bedtime and awakens him during the night.

Examination shows skin slightly macerated, several skin fissures, sphincter very tight. Digital examination shows an anal fistula with an opening posterior center with small internal hemorrhoids. Cultures were taken and streptococcus fecalis was reported. I operated for the fistula telling the patient that it would not cure his pruritus. For two weeks following the operation he was free from itching when it returned stronger than ever and autogenous vaccine was given for eighteen treatments and the patient was discharged without itching.

CASE 132.

December 4, 1916. Mr. C. Insurance inspector. Not constipated, has had pruritus ani for the past two years, perfectly well in every other way.

Examination shows many skin fissures, loss of pigment. One good-sized spot at the mucocutaneous border. Sphincter normal, no internal hemorrhoids, diseased crypts or other rectal pathology. Cultures positive for streptococcus fecalis. This patient had sixteen treatments with vaccine purported to be three billion to 1 c.cm. This case came during the time we were having trouble with the vaccines and he received almost no benefit.

CASE 133.

January 6, 1917. Mr. C., aged 61. Superintendent. Not constipated, has had itching and soreness for a short time, he used ointment and it improved for a time and then got worse.

Examination shows skin irritated and partly denuded, sphincter normal, four hypertrophied papules with diseased crypts that are not very tender, no internal hemorrhoids of any account. Proctoscope shows no growth, mucous membrane a little redder than normal. Cultures taken and reported positive for streptococcus fecalis. Patient not treated.

CASE 134.

January 11, 1917. Mr. K. Conductor. Is constipated, has had pruritus ani for ten years, eight years ago was jaundiced and had albumen in the urine for a short time. Had boils on the back of his neck for the past year.

Examination shows the skin for two inches around the anus largely denuded, the hair had been shaved off. Sphincter normal, no internal hemorrhoids, one diseased crypt. Culture shows streptococcus fecalis. No treatment given.

CASE 135.

January 29, 1917. Mr. B. Musical director. Not constipated, pruritus ani and scroti for the past three years, has also had psoriasis of the scalp for the past three years. Itches all of the time but worse at night, gets only two to three hours sleep. The scrotal involvement is of recent origin.

Examination shows no internal hemorrhoids, sphincter normal, one diseased crypt. Cultures positive for streptococcus fecalis. This patient had his first treatment here and inasmuch as he was leaving town for Schenectady I asked Dr. McMullen of that city to continue the treatment. Six weeks later a letter from the patient said that he was very much improved and was leaving for another city and would continue the treatment there. No further report.

CASE 136.

February 27, 1917. Mr. ———. Attorney. Not constipated, has had pruritus ani for the past three years. Two years ago was operated for thrombotic hemorrhoid. Urine normal. Itches some in the daytime, but severely at night and is increasing in intensity. Skin moist and fissure lessened pigment. A small round opening in the skin at the verge of the anus with undermined edges. I cut this out but it made no difference with the pruritus. No internal hemorrhoids, diseased crypts or other anal lesions. *Streptococcus fecalis* was found on the third culture, but owing to the fact that the bacteria did not grow well no vaccine was made. This patient is being treated by the use of Parke, Davis & Co. stock *streptococcus fecalis* vaccine and is improving.

CASE 137.

March 10, 1917. Mr. D., aged 35. Editor. Not constipated. Has had pruritus ani for the past fifteen years. Never has had any other sickness, itches severely day and night.

Examination shows no skin tags, skin is swollen, in folds, loss of pigment extends on perineum to the base of the scrotum, sphincter normal, very small internal hemorrhoids that give no trouble. Cultures were positive for *streptococcus fecalis*. I started him on autogenous vaccine giving him four doses at which time he moved to New York City. I referred him to a New York physician to continue the treatment. Improvement continued until the first vaccine was used up. Before new vaccine could be made he began to have a return of the itching, but will continue treatment with the new vaccine. Urine normal except for three plus indican.

CASE 138.

March 3, 1917. Mr. U., aged 61. Farmer. Has been constipated, but is better now. Can't remember when he did not have pruritus ani.

Examination shows the skin fissured, rugosed, no skin tags, sphincter normal and canal normal. Culture showed no growth of *streptococcus fecalis*, but a second culture was positive. He began treatment and improved, but just as he was getting on nicely the spring farm work came on and he was obliged to discontinue treatment. Urine normal except for indican three plus.

CASE 139.

March 31, 1917. Mr. S., aged 29. Manufacturer. Not constipated, has had pruritus ani for twelve years. Skin is macerated and fissured which extends up both sides of the perineum and back between the folds of the nates posteriorly. Cultures showed *streptococcus fecalis*, treatment with autogenous vaccine. Improvement began after the fifth injection and at the present time is having almost no itching and is still under treatment.

CASE 140.

April 2, 1917. Miss V. B., aged 52. Constipated all her life, has had pruritus ani for the past twenty years and sometimes passes a quantity of mucus streaked with blood, comes with great force at such times and would lose control if not ready, takes petroleum oil all the time. Itch troubles at bedtime and in the night and when scratching herself may pass a quantity of mucus and will then be easier.

Examination shows the skin about the anus swollen and in folds. Sphincter not very tight, no internal hemorrhoids, diseased crypts or hypertrophied papules. Proctoscope shows a congested mucous membrane sigmoid filled with feces. Culture positive for *streptococcus fecalis*. Urine normal. Not treated.

CASE 141.

April 9, 1917. Mrs. S., aged 35. Constipated all her life, pruritus ani for the past three years, came on suddenly and intense at first, worse at bedtime and in warm weather.

Examination shows skin almost normal in appearance, sphincter normal, no internal hemorrhoids, diseased crypts or hypertrophied papules. First culture negative but second showed streptococcus fecalis. Autogenous vaccine was sent to her family physician out of town for treatment. Urine normal. No report from treatment.

CASE 142.

May 9, 1917. Mr. C. Mechanic. Not constipated. Claims to have had itching only two weeks, began suddenly. Culture showed streptococcus fecalis. Autogenous vaccine made and is just beginning treatment.

CASE 143.

May 3, 1917. Mr. S., aged 34. Merchant. Semi-constipated. Pruritus ani for the past ten months. Three cultures were taken, the first ones were sent to our own laboratory and one to Parke, Davis & Co. The latter reported streptococcus fecalis, our own laboratory found streptococcus on the third culture. Treatment in this case is being done with stock vaccine from eight different strains made from streptococcus fecalis of the strength three billion dead germs to 1 c.cm. furnished by Parke, Davis & Co. Patient just beginning treatment.

CONCLUSIONS.

1. Conclusions of former years are confirmed and most of them are strengthened by experience of the past year.
2. The troubles I have had with the laboratory work as shown herein give proof that the benefit received by patients following the use of streptococcus fecalis vaccine is not a coincidence.
3. Increasing proof that if rectal pathology is present with streptococcal infection of the anal skin, an operation will not cure the pruritus ani.
4. Increasing proof that if rectal pathology is present without a streptococcus infection of the anal skin, an operation will cure the pruritus ani.
5. Continued proof that there may be complicating infections of the anal skin, in pruritus ani, by staphylococcus or bacillus coli.
6. Having published six years of research work, taking into account the report of physicians in this country and abroad who have confirmed my findings as to the skin infection, I feel justified in now claiming that the etiology of pruritus ani is a skin infection and that the streptococcus fecalis is the usual bacterium.

CHILD STANDARDIZATION AND THE X-RAY.

BY LIEUTENANT F. J. MOFFETT, M.D., Clyde, Kansas.

Fearing the fate of the great bird of the old German tales, which, newly-hatched, wished to see the whole world at once and went blind, I have taken only two facets of the glorious diamond of childhood as it glints and glows in the revealing light of the Roentgen Ray.

As was written two thousand years ago, "Except as ye become as a little child, ye cannot hope to enter" the haven of successful operation with children. Imagine, therefore, yourself as a little child, a selfish, over-stimulated, precocious American child, for we do not protect our children from the strains of adult life as do the English. Imagine yourself such a child in the ultraimaginative period of childhood with the savage instincts beginning to come into play about an education of Mother Goose, Grimm's Fairy Tales, and a choice collection of elves, imps, and gnomes, not to speak of giants, ogres, and devils galore. Imagine yourself as such a child brought by some grown person for a purpose you do not understand into a room full of mysterious wires, massive boxes, and sputtering sparks about a peculiarly lighted funny-shaped bottle hung on a stick! You become afraid and panic stricken, and nothing can be said or done to combat the awful suggestiveness of the place. Your scanty treasures of biblical lore come into the foreground, and when the operator, dressed in protective garments, appears, you immediately recognize the bulges of probable horns and tail, and the horrible picture of the Dantesque hell is complete.

Pardon the verbosity, but we should never in our enthusiasm for the work pass the point where the Scottish poet cries:

Wad some power the giftie gie us
To see ourselves as ithers see us.

Confidence with adults is half the battle; with children it is nearly the whole thing, for in a child we have imagination unbalanced by reason with which to deal. Consequently, every measure should be taken to gain and maintain confidence. Beginning with the front door of the office, the arrangement of the rooms, the selection of furniture and equipment, and the personnel of helpers and their manner should not only be a picture of propriety and adaption to the uses of x-ray, but should also be a study in the cumulative growth in confidence in the x-ray operator. When one studies the laws of suggestion and repetition to gain a desired

suggestive effect as practiced by any successful merchant in his store arrangement, one is astounded by the lack of appreciation of the principle in the offices of physician, where we are above all things merchants in confidence. By the time the child reaches the x-ray room, which, by the way, should be decorated in tones of neutral gray, composure should have been obtained and confidence should reign supreme.

Previous to entrance all mechanical and electrical factors which might disturb the happy condition must be eliminated, and as far as possible there should be no tube-testing, passage of sparks and uncertainty as to proper position of the patient, or location of needed articles. The child being in the room for a given definite purpose, that purpose should be carried out deftly, quickly, and with mechanical precision. The fewer persons in the room consistent with expeditious effort the better. Let Aunt Sally and Cousin Tom stay outside.

I have written at some length upon this matter because though seemingly simple and trite, it is important in that even adults in the presence of pain, or upon being thrust into strange and apparently dangerous surroundings, tend to revert to the mental processes of childhood. Confidence is only appreciated when we are trying to keep old Lady Busybody from forcing her family physician into the middle of a forceps case.

The general mind or Zeit-Geist of America is mechanical and commercial in turn. We hear much of cost, overhead, and fixed expense. Consequently, from a perusal of such subjects, we find that it is cheaper to manufacture in gross lots and in vast factories, and the individual workman, who took pride in his finished product has given place to a machine, tended often by a child or a young girl who knows only one operation of a complicated process. It is not meet for me to speak of the vast and far-reaching social and moral changes which the modern factory system involves. I will leave that to Karl Marx and Upton Sinclair. It is our purpose to insist that the life and future usefulness of the child shall not be jeopardized by the machine.

Our tendency to do things in the biggest and seemingly the cheapest way, and our taste for mechanical precision has built up in our midst an educational Frankenstein monster which fears no deity and has respect for parents only as they are producers of its raw material. The public school system is distinctly autocratic in type, and mechanical in its forward stride, class by class, and is a far cry from the effective personal association of the English tutor and the simple peripatetic methods of Aristotle. Hence, we have the same problem as with child labor. We must protect the child from the machine, and some method of measuring each child's general efficiency or period in development must be obtained. We

must, if possible, standardize our little "tin Lizzie" with the same micrometric accuracy that is used by Ford and Collins.

We find several attempts at such standardization. The first is the legal or chronological standard. A child is ten years old and nothing more, ignoring the fact that there are great differences between the sexes and between ten-year-olds of the same sex. The standard is too crude for further consideration.

Dr. Katharine B. Richardson and a few others have endeavored to solve the problem of employment—the man and the job and the elimination of misfits—and has classified men for certain classes of work, basing her classification ultimately on the evolutionary origin of the blondes and the brunettes. Certain types and physical characteristics she assigns to certain types of mental or physical labor, and while she seems to have accomplished something, still to a rank outsider, too many of her classifications have somewhat of the reeking smell of far distant phrenology. We mention this in passing, only as it is an attempt at standardization.

I am not sufficiently familiar with the Binet-Simon tests to discuss them. It is enough for our purpose to say that by these tests pupils are graded, that the large powers of the mind are found to develop early with subsequent growth in restricted fields, and that many men and most delinquent women are found to have eight- or nine-year-old minds, all of which conditions are not taken into account by the Legal Standard.

There is also a rough and ready height-weight syndrome, which merely means that a child so high may be expected to weigh about so much, and like the legal standard is too coarse for child classification.

Crampton was the first to insist that some standard other than that of chronological age should be used in the treatment of children. He claimed, after exhaustive investigation, that the growth of pubic hair and the establishment of the menstrual function were more exact measurements of the development of the individual than chronological age. The periods of dentition were found to be of wide variance.

Of children of a certain chronological age Crampton found those with the pubic hair extra well developed to average 24 percent to 33 percent heavier. Postpubescents were 11 percent taller. As he went up in the grades for his children, the higher the grade, the greater averages were found of pubic hair. Naturally he concluded that the farther advanced the pubescence the greater was the scholarship, that early pubescence indicated the possibility of good scholarship and that late pubescence was indicative of poor scholarship. The apparent incongruity in the terms is lost when we remember that Freud observes that the most of our educational

processes consist in the training of transmuted sex impulses or sex sublimations.

Crampton was a pioneer in the study of child standardization, and as is characteristic of nearly all pioneers, Roentgen excepted, his method was essentially crude in character.

Rotch, recognizing this crudity, and assuming for the moment the as yet unproved identity of anatomical and physiological age, after ascertaining the true norm of 200 children by complete examination, subjected various bones and joints, including in every case the hands and wrists, to the Roentgen ray. From these findings he deduced the following results tabulated in a classification of childhood in which chronological age is ignored and the developmental findings of the x-ray only are considered.

Class A—begins to show the os magnum and unciform.

Class B—os magnum, unciform, epiphysis of radius.

Class C—os magnum, unciform, epiphysis of radius, and cuneiform.

Class D—os magnum, unciform, epiphysis of radius, cuneiform, and semilunar.

Class E—os magnum, unciform, epiphysis of radius, cuneiform, semilunar, trapezium.

Class F—os magnum, unciform, epiphysis of radius, cuneiform, semilunar, trapezium, scaphoid.

Class G—Above mentioned plus trapezoid.

Class H—Adds to the above the lower epiphysis of ulna.

Class I and J—Are differences in development of Class H.

Class K—Slightly better developed than J, but the same bones. Pisiform may be beginning to show through the cuneiform. The carpal bones are massing together.

Class L—os magnum, unciform, epiphysis of radius, cuneiform, semilunar, trapezium, scaphoid, trapezoid, epiphysis of ulna. Pisiform is seen coming out from under cuneiform.

Class M—same as L. All bones larger and close together. Pisiform nearly as large as cuneiform. Greatest development.

Some variations from the normal are found, but not to any great extent in the developmental scale. Hands may be long or short, broad or narrow, and yet conform to type. The left does not differ from the right; on other joints as the hip or knee can be used as a control as needed; the main necessity being to forget our habit of thinking in terms of chronological age.

Imagine a youngster with a brand new doll exclaiming, "This is my os magnum, unciform, radius epiphysis birthday!"

Rotch finds that the height and weight run with the anatomical development as shown by the carpal pictures, thus magnifying the importance of the x-ray findings. He also concludes that the regulation of child-life should be very much more in the hand of the

physician properly trained to cope with the problems of child-life: a conclusion of doubtful benefit under a system of democratic government. Also that the physician should be able to guard against athletic over-strain and the evils of excessive competition, both physical and mental. Every child entering our schools and factories should have the hand and wrist subjected to a brief x-ray exposure, a process easily available, and one that, with an occasional repetition, will go far to ensure a safe conduct through many of the mazes of our educational and mechanical life.

The problem of the precocious child too often pushed to his own hurt by ambitious teachers and fond parents will be solved by the x-ray, and the needed rest and open air exercise compulsorily obtained.

The stupid child, on the other hand, finds his own place, or is eliminated by the class movement. The x-ray classification may place him in a school for defectives, where by special methods under specially trained teachers, he may do better. Furthermore, the enforced x-ray examination is likely as in the case of the routine examination of throats to lead to a remedying of the stupidity.

I have endeavored to emphasize the necessity of maintaining the confidence of children and parents in x-ray work, and to portray in a feeble perspective the part the Roentgen ray will play in the general attempt to save the child from the machine.

COLLECTIVE ABSTRACTS

THE TREATMENT OF UNDESCENDED TESTICLE—A REVIEW OF RECENT LITERATURE.

By JOHN R. CAULK, A.M., M.D., of the Editorial Staff, St. Louis.

In August, 1911, I presented an abstract on this same subject. At that time it was stated that the ideal method had not been secured. Since this time a great deal of work has been done on this subject, many contributions have been made and a great deal of progress effected. The pediatricists have been more or less opposed to subjecting children to operation for the cure of undescended testicle, because of the many unsatisfactory results with surgery by the older methods. As the present technic produces such a high percentage of satisfactory corrections, I am prompted to repeat the abstract on this subject in an attempt to acquaint the profession as far as possible with the newer and more satisfactory methods. Quite a number of infants at birth have undescended testicle. Wristburg's statistics show 30 percent. Most of these descend within a few days or weeks of post-natal life. In the Hospital for Ruptured and Crippled, Coley found 3 percent of undescended testicle under 14 years of age; 2.2 percent between the ages 14 and 21, and over 21, two-tenths percent. Most of us have the feeling that this congenital abnormality is more or less rare in adult life, but, since serving on an advisory board, I have been so strikingly impressed with the frequency of this abnormality that I am sure it is much more common than it is usually supposed. Most of these men have kept their retained testicle because they were advised against surgery. A great many of them were wearing trusses to correct the hernia, but in many cases to defect the testicle.

Since it has been shown that malignancy is liable to occur in an undescended testicle, that repeated trauma is frequent, that torsion of the cord is to be considered, that extension of gonorrhea or metastatic involvement is more grave, and that spermatogenic function is handicapped, or entirely crippled, and that the testicle is almost always associated with hernia, which of itself needs surgery, and the operation for its cure is safe and practically without mortality, and the results at the present time are so encouraging, this abstract is presented.

Most men are agreed that the testicle should not be operated on in the early years of childhood for the reason that many descend spontaneously. Most authors believe the best age is from 8 to 12; some believe it is well to wait until puberty, depending, of course, on the character of the hernia and other complications. One thing which should be emphasized is the warning against the common tendency of putting on a truss, particularly if the testicle is at the external ring, for it is certainly a menace to the life of the testicle on account of its constant pressure and trauma, and, while it may satisfactorily hold the hernia, it usually harms the testicle. Whether or not the placing of a testicle into a normal scrotal position will completely rectify the pathological differences from its mate, I am not prepared to say. In many cases it unquestionably does not. If taken early enough there can be no doubt it

will be given a better chance and all the other untoward changes are shunned, and the cosmetic result is worthy of the surgery if the spermatogenic function is not restored or maintained. Fortunately for spermatogenesis the condition is so frequently unilateral. Eccles and Uffreduzzi have shown that in the undescended testicle only about 10 percent of the spermatogenic cells remain intact in the adult. A brief resume of the different operative technic follows:

1. One of the first methods was that advocated by Langenbeck, which consisted in massage, manipulation, and the application of a forked truss, to retain the testis. The results by this method were unsatisfactory, the truss causing much discomfort to the patient and retaining the hernia unsatisfactorily.

2. Orchidectomy has been gone a great deal for this malady, but its objections are so apparent that they need not be mentioned.

3. Replacement of the testis within the abdomen with closure of the internal ring has been suggested and carried out. There is no advantage to this except that it cures the hernia, but the testicle is exposed to all the dangers which might befall a nondescended organ, and it is in a more dangerous locality for trouble to ensue.

4. Shueller's Operation. It was thought that the open tunica vaginalis was the cause of the non-descended testis, and in this operation the peritoneal prolongation is divided at the internal ring and a new tunica formed by the lower part, the testis anchored to the scrotum by sutures. This is only applicable when the testis is already close to the scrotum. There are many modifications of this operation, such as suturing the fascial structures of the cord to the external ring and suturing the undescended testicle to its fellow on the opposite side after incising the septum scroti.

5. Lanz's Operation. Sutures are passed through the testis. These are passed through the scrotum and left long and fastened to a wire cage or to the thigh, the idea being to exert continuous traction in order to lengthen the cord. This operation has many recurrences.

Starr fastens the testis to a wire splint which is fixed on one end to the pubic bone and at the other to the scrotum.

6. Keetley-Torek Operation. This operation consists in liberating the testis, correcting the hernia and the fixation of the testis to the skin-flap on the thigh with the idea that the fixation will lengthen the cord. At a second operation the scrotum and testis are liberated from the thigh and the testis replaced in the scrotum. This operation has a very uncomfortable postoperative course for the patient, on account of the traction and dragging on the testis, the very awkward gait, the eczema which often develops, and the danger of infection.

The Beck necktie operation, according to Moschowitz, at best can only hold the testis outside of the external inguinal ring.

7. The Bevan operation, which is the most familiar, consists in isolating and freeing of the hernial sac with closure of the peritoneal cavity in the usual way. The distal part of the sac may be cut off close to the testis, may be cut some distance from the testis and new tunica vaginalis made, or it may be inverted and sutured. The isolation of the sac is very important, as one has to be very careful in separating it from the vas, since the ultimate viability of the testicle depends upon the artery of the vas, and, if this is injured, the result will be necrosis of the testicle. Otherwise, as Moschowitz has shown in his experiments, there is not a general necrosis, but in some instances a slight central zone necrosis with the periphery in a fair state of preservation. The operation will not be described in detail. The substance of the operation being that the vessels are ligated and the vas left untouched, the vessels being the obstacle to the replacement. The work of Griffiths and Hill has shown

that the artery of the vas is sufficient for the preservation of the testicle, while others, notably Mixter, have shown that when the vessels of the cord are ligated atrophy follows in 92 percent, whereas if the vessels are not disturbed it occurs in only 5 percent. It certainly seems that atrophy of the testicle following ligation of the vessels is much more frequent than was formerly supposed, so most of the recent operations had been modifications of the Bevan operation with an attempt to save the vessels of the cord.

In 1911 Davison of Chicago proposed a most ingenious method of dealing with undescended testicle. He recognizes as the main cause of the retraction, the shortness of the cord from its makeup at the internal inguinal ring to the testicle, and his method is a transplantation operation whereby the spermatic vessels and vas are brought together at the external ring instead of at the internal ring. Ligation of the vessels of the cord interferes with the lymph and nerve supply of the testicle; and he thinks if this can be obviated, as by transplantation, the preserving of the component parts of the cord means that a great deal has been accomplished. The operation is as follows:

The inguinal canal is exposed by dissection as in the Bassini operation for inguinal hernia. The testicle and cord are freed. The posterior wall of the inguinal canal is treated very much as in the Fowler operation. After ligating the deep epigastric artery, an incision is made through the posterior wall of the inguinal canal from the external ring to the pubic bone, just beneath the site of the external inguinal ring. This destroys the internal inguinal ring and exposes the peritoneum until its desired length is obtained. The spermatic vessels are then sponged loose from the peritoneum by gauze carrying with them lymphatics and nerves which are preserved. A bed for the testicle is made in the scrotum and silkworm gut suture is passed through the gubernaculum testis and both ends are passed through the most dependent part of the scrotum. Testicle placed in the scrotum, the posterior wall of the inguinal canal is repaired, the cord is made to come through at the lower angle of the incision. The internal ring is closed, the conjoined tendon is sutured to the underside of Poupart's ligament above the cord, the fascia of the external oblique muscle is sutured to the edge of Poupart's ligament above the cord, and the skin wound is closed. A strip of adhesive plaster is placed around the thigh just above the knee with a flap on the inner side of the thigh. To this is fastened a thin rubber band to which the sutures from the scrotum are tied with sufficient tension to make the band taut. A light plaster of paris cast to prevent flexion of the thigh and intermittent traction on the gubernaculum is employed. Davison in his article presents three patients and his results seem excellent.

Eisendrath has reported 38 cases of very satisfactory results by a modification of the Bevan operation, in which he calls attention to thoroughly separating the vessel groups of the cord from each other and from the sac.

In 1915 Wolfer proposed a modification of the Davison operation, as he did not believe in cutting the vessels of the cord. His technic consists in freeing the cord, separating the vas from the rest of the structures, and exposing the deep epigastric vessels and bringing the testicle behind them so that they enter at a lower level in order to get greater length. The wound is closed as in the Davison operation. He places a suture from the periosteum and deep tissue over the pubic spine to the inner border of Poupart's ligament, sufficient to retain the testicle.

Mixter reports 34 cases in which he has used a modified Bevan technic by which the vas and vessels have been freed within the internal ring, and his chief point consists in transposing the internal ring down to the deep epigastric vessels. This he does to insure sufficient length to vas. His end results have shown the testicle in the bottom of the scrotum in 15 cases; upper pole in 12;

retracted in one; testicle developed normally in 18 cases; partial atrophy in 5; complete in 2. He was compelled to resect the spermatic vessels in four cases, of these 2 atrophied, 2 developed normally. The two that atrophied had required complete resection of the vessels.

In 1917 Keyes reported 33 cases with 88 percent good results, and no mortality. His operation, too, is a modified Bevan operation. He tries not to ligate the vessels, believes they can be usually lengthened by free separation of the different groups of vessels by removing their fascial coverings. If the vas is too short he suggests transposing to the inner side of the deep epigastric vessels. He sutures the testicle to the bottom of the scrotum.

Thompson, of London, suggests an entirely different idea, both in incision and the effect of the scrotum. In making the original incision he leaves an elliptical island of tissue. This he removes and ransplants into the scrotum in order to prevent retraction. There is very little said about the type of the transplant.

As a rule the recent operations are either modified Bevan operations which are designed to prevent cutting of the cord, or modified Davison operations which aim to bring the vessels down below the deep epigastric vessels without ligating the latter vessels. The results of these later operations as far as the transposing of the testicle and its maintenance in the scrotum are concerned, are exceedingly satisfactory, and those in which the vessels are not ligated seem also satisfactory as far as the life of the testicle is concerned. With this in view it seems that a radical cure of undescended testicle should be more frequently done, in the face of these encouraging results.

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THE ROENTGEN RAY IN MAMMARY CARCINOMA— A REVIEW OF CERTAIN LITERATURE.

By LIEUTENANT IRA H. LOCKWOOD, M.R.C., Lincoln, Nebraska.

That precancerous predispositions exist, in the majority of cases of tumor of the breast, there is no doubt, and the best evidence of this stage is shown in fibroadenoma of the breast, chronic mastitis, cysts, and other benign conditions.

In classifying tumors of the breast, it has been customary to divide them into two groups, the benign and malignant. This division has, in a way, prevented a positive diagnosis of certain cases and given the patient fewer chances for a complete recovery—for our past teaching has been to let the benign tumors of the breast alone, that no harm could come from them.

Recent reports¹ show that from thirty to thirty-five percent of all tumors of the breast were benign in the beginning. This does not mean that the earlier reports, that eighty percent were malignant from the beginning, were incorrect, but it indicates that this difference of fifteen to twenty percent is brought about by removing tumors of the breast while benign instead of waiting until they became malignant.

It is certainly most unreasonable that fibroid and cystic tumors of other parts of the body should be removed, but that such conditions should be allowed to go untreated in the breast. Obviously, would it not be better to have but one classification and treat all tumors of the breast in the same manner until positive diagnosis was made, bearing in mind that sixty to sixty-five percent of breast conditions are malignant from the beginning, and that sooner or later the greater majority of those benign at the start, become malignant, or potentially so, and that twenty percent of carcinoma of the breast occurs in women under forty, and Rodman² reports one case in a girl of seventeen, and another of twenty-one.

Taking this classification for granted, the treatment of breast conditions becomes principally that of a carcinomatous condition.

Extension of the Cancer Cells.—Handley believes that cancer originating in the breast disseminates always through the lymphatics in the fascia and that the embolic theory has been accepted chiefly because there is no proof against it. Embolism is necessarily an impartial process in which all organs are liable and cancer is by no means impartial. The liver is much more frequently the seat of secondary carcinomatous nodules, while the spleen and lung most often show emboli in pyemia.

Handley³ also calls attention to the fact that each variety of primary growth has a special metastatic topography; for example, breast and thyroid frequently show metastatic growths in bone, while cancer of the stomach seldom ever gives metastatic involvement in bone tissues.

The fact that the femur and humerus are frequently affected by carcinomatous growths and the tibia and radius almost never are affected, argues against the embolic theory; as the terminal vessels which would be most susceptible to emboli are in these distal bones. There seems to be no argument against the lymphatics being the chief distributors of cancer cells, from the breast, but it would also seem that the blood stream does at times play a part in dissemination of the cancer cells. As Judd says that in the Mayo Clinic they have observed cases in which there was no evident lymphatic involve-

ment and yet a well-advanced metastatic growth was present in one or more bones. Dissemination through the lymphatics means extension by way of the lymph vessels and glands lying in the skin, subcutaneous fat, deep fascia, muscles and bones.

Primary Lesion in the Breast.—Is invariably a single focus. From this focus the cancer cells are usually transmitted, first through the lymphatic spaces of the breast, then into the main lymphatic channels, and by these are carried to the glands of the axilla. If the lesion is superficial, the cells may pass through the lymphatic vessels of the skin and through these vessels to the axillary glands. At least ninety percent, possibly all the cases that show this involvement of other parts, show this extension into the glands of the axilla. Lymphatic vessels pass directly from the breast to the glands about the clavicle. Handley³ says he has never known these glands to become involved until after those of the axilla.

Opposite Breast.—Leading to the opposite breast are cutaneous lymph glands, and probably also vessels in the deep fascia. These pass across the mid-line to the opposite breast and involve the breast and glands of the axilla. It is involved in from ten to twelve percent of all late cases.

Mediastinum.—A set of vessels from the deep lymphatics—perforate the second and fourth intercostal spaces and pass directly to the mediastinal glands, thus producing metastatic carcinoma of the mediastinum.

Liver.—The deep lymph vessels also pass directly to the liver, and the invasion of this organ can be explained by lymphatic dissemination.

Spine.—These lymph vessels also accompany the blood vessels to the spine and the cancerous cells are carried through these to the spinal column.

Muscles.—There are also several cases on record in which the lymphatics penetrating deep into the muscles were extensively involved by carcinomatous cells.

Bones.—The frequency with which mammary carcinoma produces metastases in bones is well known and whether this metastasis is caused by lymphatics or emboli is of little consequence, since the ribs and sternum are most frequently involved and this involvement occurs by direct extension.

The Femur, vertebrae and humerus come next in frequency of involvement.

In deciding whether a case of cancer of the breast is too far advanced for operation, it is often advisable to have radiographs taken of the bones most frequently involved, since it is obviously useless to remove the breast, should any of the bones be involved.

The abundant lymphatic drainage from the breast renders it almost impossible to cure malignancy in young individuals, and especially if the breast be lactating. Mayo Clinic reports several cases of carcinoma in lactating breasts. In none of the cases did the individual live over two years.

Normal human tissues in health are possessed of a certain degree of vitality. They react to various stimuli, in a uniform degree. Healthy tissues possess a certain degree of physiologic resistance to irritating or destructive stimuli. It is also possessed of certain well-marked reparative powers when injured. Diseased tissue, on the contrary, is an entirely different condition. If malignancy be present, the tissue is composed of rapidly growing cells with changed structural relations, blood-supply of hasty construction, and tissue showing physiological variations multiplying rapidly with small powers of resistance and slight reparative power. If such tissue be subjected to quantities of Roentgen ray correctly prescribed and administered, it will undergo tissue death either slowly or en masse according to the degree of rapidity with which the dose has been administered.

Small doses of Roentgen ray or one of so high penetration that little has been absorbed may only stimulate and irritate such a lesion, and instead of

producing beneficial results is prone to be followed by an increased growth.

The most enthusiastic surgeons claim but eighty percent cures in the earliest cases, that is before gland involvement has taken place. Rodman⁴ maintains that surgery should cure fifty percent of all cases, provided they can be subjected to complete operation early in the course of the disease. He also says that the statistics of Johns Hopkins Hospital indicate that only twenty-seven percent of patients at the time of operation are free from axillary involvement, and Halstead thinks this percentage too high, therefore, only three-fourths of the patients who come for operation of carcinoma of the breast have only a chance of cure in twenty-seven percent of all cases.

The cases of carcinoma of the breast as they come to the roentgenologist may be divided into three classes:

1. Those hopelessly inoperable.
2. Those in which the disease is advanced and the prognosis more favorable.
3. Those in which the Roentgen rays are applied as past operative measures.

In the first class, or the so-called inoperable class, there are many cases on record in which the patient was sufficiently benefited to justify the treatment. Boggs⁵ gives a series of twenty cases in which each one was relieved from pain for a period averaging a year. In nearly every case the mass was reduced in size and in some cases became freely movable. Almost everyone of these patients was able to perform her usual duties, free from pain and the offensive odors so distressing in ulcerated carcinoma.

The second class are even more amenable to the Roentgen rays and Pfahler⁶ gives some astounding results in his article on inoperable carcinoma of the breast.

It is in the third class, the post-operative cases, that we expect the best result from the Roentgen ray.

Since recurrence is likely to occur in sixty-one percent of the general run of cases as they appear for operation, with only twenty-seven percent free from axillary involvement, and an estimated recurrence in twenty percent of these early cases without glandular involvement, it certainly is our duty to try and give these unfortunates some chance of permanent recovery.

The object of the post-operative treatment is *first*, to cause the atrophy or destruction of outlying cells or glands that have not been reached by the surgeon, and the destruction of cells that have been transplanted into the wound; and *second*, to cause the obliteration of lymphatic channels, which would otherwise permit dissemination of the disease, therefore, the earlier these cells are destroyed or rendered inactive by the rays, the less likelihood will there be of multiplication and further development.

As evidence of the importance of thorough treatment even in cases in which there is no glandular involvement, Judd⁷ reports two cases in which there was a very small lesion of the breast, and no glandular involvement could be found. They were classed as favorable cases, yet developed early metastasis and one died within two years.

Time of Beginning Treatment.—Pfahler⁸ says, when practical; it is desirable to give the treatment through the open wound, just as the surgeon finishes the operation and before suturing.

The layers of the skin are drawn back, the operative field covered with sterile towels, and the rays focused through the wound deep into the axilla. This treatment should not require more than twenty minutes if everything is in readiness beforehand. The wound is then sutured. In no case has this procedure interfered with the healing of the wound. If this is carried out, the patient should receive the first of the regular post-operative treatments at the end of the first or second week. When it is not practical to give the treatment through the open wound, it should be given just as soon after the

operation as the condition of the patient will permit. It is a mistake to wait until the patient begins to have some induration of the tissues.

The treatment with the Roentgen ray of primary, recurrent and metastatic growths of the breast, I believe, should be given according to the following technic:

TECHNIC.

The fractional method of treatment is condemned as it usually only stimulates the growth, and the technic of deep Roentgen therapy should be employed, carrying out the cross-fire method as advocated and first used by Gauss.

This cross-firing required a certain amount of engineering skill. The object is to have the rays cross from as many angles as possible through the deeper portions of the growth, and in crossing through these deep portions, one is compelled to have treated all the outer borders of the tumor and the lymphatics leading from the parts.

Each area of the skin through which the rays are passed to reach the central portion of the tumor is spoken of as portals of entry. The more portals of entry and the more angles from which one attacks the tumor within certain limits, the deeper the effect obtained.

Each portal of entry should be carefully separated from its neighbor by means of sheets of lead strapped to the skin by adhesive plaster so that there is a clear space of untreated skin about one-eighth inch wide between the areas, for if the areas overlap, a burn may be produced, or instead, lead cones may be used and these brought in contact with the skin.

Division of Areas.—The field should be divided into from ten to twelve areas, two or three over the incision, depending upon its length—joining these are three triangular areas radiating from the shoulder and lying between the clavicle and axilla—one dose through the axilla another through the posterior fold of the axilla, the space between the spine of the scapula and the clavicle is divided into two spaces—one or two areas between spine and the scapula with the rays focused toward the axilla and mammary region. By this method the rays reach the mediastinum to a greater or less degree. Care should be taken not to have the rays cross too much in the supraclavicular space or burns will result, due to the lack of depth of tissues.

Filtration.—Filtration does not eliminate the dangers of burns, but it does permit the administration of at least ten times the quantity of rays into the deeper tissues, and when filtration is added to the cross-fire method, we can increase the deep results perhaps one hundred times as much as we could do ten years ago.

Filters.—The following material may be used as filters: aluminum, compressed paper, tanned leather, chamois leather, boiler felt, tungsten lint, lead acetate lint.

1 mm. of aluminum is equivalent to each of the following:

- 7 mm. compressed paper,
- 7 mm. tanned leather,
- 18 mm. chamois skin,
- 30 mm. boiler felt,
- 4 layers tungsten lint,
- 2 layers lead acetate lint.

The so-called glass filtration that is 4 mm. of glass and 2 mm. of aluminum, plus sole leather has the advantage of service as an insulator and is less affected by the heat, 3 mm. of glass being equal to 1 mm. of aluminum.

In using the technic of deep therapy, filters should be used having the equal of 3 mm. of aluminum plus 1 thickness of sole leather. The aluminum filters may be placed immediately underneath the tube, but the sole leather should

be placed on the skin. In treating rounded areas, chamois the equivalent of sole leather will be preferable as it will lie in closer contact with the skin.

Dose.—The dose refers to the amount of treatment given through each particular area of skin, when considering the amount to be given, there are three essential points to be considered:

1. Penetration.
2. Measurement of the amount of rays the patient receives.
3. Filtration.

Penetration.—The ideal penetration is one in which the rays pass to the mass or tumor to be treated and are absorbed there.

Johnson⁹ says there is danger of obtaining too much penetration; that the rays are capable of passing through the mass and are not absorbed. He used an eight-inch spark gap in deep roentgenotherapy with excellent results.

Case¹⁰ believes the harder the rays the more beneficial the results and uses a spark tap of nine and one-half inches. This limit used only because of the dimensions of the tube, believing that a tube capable of permitting a greater spark-tap will soon be available and practical.

The Benoist penetrometer is probably the most exact method of measuring the penetration power of the tube.

2. Measurement of the amount of rays the patient receives is accomplished by two methods:

1. The direct.
2. The indirect.

In the direct method the rays are measured by several scales. The following are probably the most exact and the most often used:

The Sabouraud Scale, which consists of slips of paper specially prepared with barium platinocyanide that is placed half way between the target and the skin. The pastile is green in color and under the rays changes to a brown, then compared to a scale Tint B of which is equal to an erythema dose. The pastile should always be compared to the book from which it is taken.

The pastiles discolor in the same way when exposed to x-ray, electric light, or sunshine. Therefore, they should be examined in very weak daylight.

Keinbock Quantimeter.—Consists of strips of bromide of silver paper enclosed in light-tight envelopes and a standard scale. The envelope containing the pastile is placed on the part of the skin being treated. After treatment the pastile is developed in a standard solution for one minute and then compared to the scale. The scale has nine tints from 0 to 10. Tint 1 is considered the unit and is denoted 1 X. 10 X is equal to Tint B of the Sabouraud scale.

Hampson's Radiometer.—Consists of a series of twenty-five very carefully graded tints, which represent the color assumed by a pastile of borium-platinocyanide under the action of x-rays. The Zero Tint is the color of the unexposed salt and the 16 Tint the color equivalent to Tint B of Sabouraud Scale, or 10 X of Keinbock's, if the pastile is placed midway between the target and skin. The viewing of these tints should be by artificial light. In this method if the pastile is placed on the skin underneath the filters, an erythema dose is obtained when the pastile has turned four divisions of the scale. When the sensitive pastiles are exposed to daylight, they return to a great extent to their initial color and the pastile may be used again by finding the color on the scale and an erythema dose is given when the color has changed four divisions on the scale.

Indirect Method.—Is used to measure not the rays, but the quantity of current passing through the tube; and the number of milliamperes multiplied by the volts used gives the quantity of x-rays generated in the tube. The quantity of x-rays received by the object depends upon (1) the quantity of

x-rays generated, (2) the distance between the tube and object, (3) the time of exposure, (4) the sensitiveness of the object treated.

After having worked out the treatment unit, you desire to use carefully noted milliamperes, spark gap, distance and time to give the unit. You are able to chart the machine and need use the pastiles only as a check on your treatment.

Each portal of entry may receive its dose in one series; that is, in one day without interruption, or a longer time may be taken to give the series, usually it is advisable to give the series either in one or two days.

After the technic of measuring the dose in certain units has been mastered, the problem of how many units to give is still uncertain, and to a large extent dependent upon individual judgment, in determining the amount required for the treatment of any conditions, it must be remembered that the active dose is the physical dose multiplied by the coefficient of susceptibility of the tissue under treatment.

In applying these massive doses, we must not be unmindful of the possible dangers, and possible late effects from a repetition of such doses.

The interval between treatments is usually determined in each individual case, but the second treatment is usually given at the end of three weeks and the third four weeks later. Generally from three to six series are given, depending, of course, upon the individual case and the degrees of malignancy.

One should not set a definite number of series but should simply increase the interval of treatment as seems best, until one can feel reasonably certain that the patient may remain well.

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CURRENT NOTES

Army Medical Corps Examinations.

The Surgeon General of the army announces that preliminary examinations for the appointment of first lieutenants in the Medical Corps, U. S. Army, are being held at numerous points throughout the United States on the first Monday of each month.

Full information concerning the examination may be procured on application to the "Surgeon General, U. S. Army, Washington, D. C." The essential requirements to securing an invitation to report for examination are that the applicant shall be a citizen of the United States, between 22 and 32 years of age, a graduate of a medical school legally authorized to confer the degree of Doctor of Medicine, of good moral character and habits, and shall have had at least one year's post-graduate hospital internship.

The Government cannot pay to applicants any portion of their expenses incurred in connection with their examination, and due consideration, therefore, will be given to localities from which applications are received in order to lessen such expenses as much as possible. Chemistry and physics have been eliminated as subjects of the examination.

Those applicants who successfully pass the examinations are commissioned first lieutenants in the Medical Reserve Corps, and sent to either the Army Medical School in Washington or to a training camp for a course of instruction, covering a period of approximately three months, during which time they draw the pay and allowances of their grade. If, at the close of their instruction, they pass the final examination, and are favorably recommended, they are commissioned first lieutenants in the medical corps of the regular army.

The Medical Corps consists of commissioned officers in number approximately equal to seven for every one thousand of the total enlisted strength of the regular army authorized from time to time by law, proportionately distributed among the graded and in the ratios as follows: colonels, 3.16 percent; lieutenant-colonels, 5.42 percent; majors, 23.7 percent; captains and first lieutenants, 67.72 percent. Promotion to the grades of major, lieutenant-colonel, and colonel is by seniority, subject to examination.

The Surgeon-General, who, under the permanent law, has the rank of brigadier-general and is the chief of the Medical Department, is selected from among the officers of the Medical Corps not below the grade of lieutenant-colonel.

PAY AND EMOLUMENTS.

To each rank is attached a fixed annual salary, which is received in monthly payments, and this is increased by 10 percent for each period of five years' service until a maximum of 40 percent is reached. A first lieutenant receives \$2,000 per annum, or \$166.66 monthly. At the end of five years (during the period of the war, at the end of one year) he is promoted to captain, subject to examination, and receives \$2,400 a year, with an increase of 10 percent after five years' service, making \$2,640, or \$220 per month. After ten years' service the pay would be \$2,880 annually, or \$240 per month. The pay attached to the rank of major is \$3,000 a year, which, with 10 percent added for each five years' service, becomes \$3,600 after ten years' service, \$3,900 after fifteen years' service, and \$4,000 after twenty years. The maximum monthly pay of

lieutenant-colonel, colonel, and brigadier-general is \$375, \$416.66, and \$500, respectively. Officers, in addition to their pay proper, are furnished with allowance of quarters according to rank, either in kind, or, where no suitable Government building is available, by commutation; fuel and light therefor are also provided. When traveling on duty an officer receives mileage for the distance traveled, including the travel performed in joining first station after appointment as first lieutenant. On change of station he is entitled to transportation for professional books and papers and a reasonable amount of baggage at Government expense. Groceries and other articles may be purchased from the commissary at about wholesale cost price. Instruments and appliances are furnished for the use of medical officers in the performance of their duties. Well-selected professional libraries are supplied to each hospital, and standard modern publications on medical and surgical subjects, including medical journals are added from time to time. At each military post there is also a laboratory, and medical officers are encouraged to carry on any special line of professional study which appeals to them and which fits them for their duties as medical officers.

Officers of the Medical Corps are entitled to the privilege of retirement after forty years' service, or at any time for disability incurred in the line of duty. On attaining the age of 64 they are placed on the retired list by operation of law. Retired officers receive three-fourths of the pay of their grade (salary and increase) at the time of retirement.

At the present time there are approximately seven hundred vacancies in the Medical Corps.

EXCLUSIVENESS.

A Musing on Hospital Behavior.

When night in the trenches is stilly
 And raids and patrols are no more,
 When China has made peace-with Chile
 And Turkey annexed Ecuador;
 When homeward to hamlet and steeple
 The soldier returns with a sigh,
 I shall build me a club for the people
 Who were hit in the same place as I.

There are clubs for the staid and the flighty
 And clubs for the learned alone,
 But give me a man with a blighty
 Exactly the same as my own;
 For a love that can never grow colder,
 For a kinship that nothing can part,
 Identical biffs in the shoulder
 Are better than birds'-eggs or Art.

In the shoulder, you mark me. It rankles
 When people accost me to tell
 Platitudinous stories of ankles
 That take such a time to get well;
 Or narrate how the medico tinkers
 A forearm that suffered mishap,
 Unaware that for serious thinkers
 The forearm is right off the map.

How they wallow in alien details
 Of where they were patched by the vet!
 It's the same with the elbow and knee tales—
 These persons are not in our set;
 They have faced in the line of the legions
 The bullets and billets of Gaul,
 But their deltoid and scapular regions
 Have not been affected at all.

But we, when my club has been founded,
 Shall sit by the smoking-room fire,
 With our coffee before us, surrounded
 By shoulders we love and admire;
 We shall show the decided improvements
 Observed in this tendon or that;
 We shall try to exhibit some movements
 And empty the milk on the mat.

What a fervor will shine in our faces,
 What wonderful yarns we shall spin,
 Reminiscently patting the places
 To prove where the pellets went in!
 O fortunate place of convention,
 Where shoulders of equals shall rub!
 And I think I've forgotten to mention
 I shall call it the Humerus Club.—Evoe.

—*Punch*, February 20, 1918.

BOOK REVIEWS.

THE PRINCIPLES AND PRACTICES OF DERMATOLOGY. Designed for Students and Practitioners. By William Allen Pusey, A.M., M.D., Professor of Dermatology in the University of Illinois, Emeritus; Dermatologist to St. Luke's Hospital, Chicago; Member of the American Dermatological Association. With 54 plates and 466 text illustrations. Third edition. New York: D. Appleton & Co., 1917.

To bring the work thoroughly up to date so many changes were required all through the text that but very few chapters remained untouched. The two subjects calling for the most thorough revision were pellagra and syphilis—the first on account of its particular importance for this country, the latter on account of the marked recent advance in knowledge and understanding of the disease. The entire subject of syphilis in this new edition is presented more fully than probably in any other textbook of dermatology, a feature which, in view of the general interest in this disease, cannot fail to render this new edition particularly valuable also for the general practitioner.

MANUAL OF SPLINTS AND APPLIANCES FOR THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY. Report of a board convened for the purpose of standardizing certain medical department supplies. By Lieutenant-Colonel William L. Keller, M. C.; Major Robert B. Osgood, M. R. C.; Major Alexander Lambert, M. R. C.; Major Joseph A. Blake, M. R. C.; Captain W. S. Baer, M. R. C., and Captain Nathaniel Allison, M. R. C. New York: Oxford University Press. 1917, 75 cents.

This manual describes briefly and concisely the various types of splints and appliances that have been found most useful at the front. It also gives the different forms of injuries for which they are to be used. The illustrations that accompany the text show the method of application. There are many useful hints, as in the application of traction, etc. The book is divided into four parts, which show the general arrangement and scope of the book: (1) General considerations and detailed descriptions of splints and appliances recommended for use at field and evacuation hospitals. (2) General considerations and detailed descriptions of splints and appliances recommended for use at base hospitals. (3) Surgical dressings and accessory supplies. (4) Descriptive illustrations. This book might well be in the hands of all medical men, whether military or non-military.

MEDICAL DIAGNOSIS. For the Student and Practitioner. By Charles Lyman Greene, M.D., St. Paul, Lecturer in Applied Anatomy, University of Minnesota, 1892-4, Professor of Applied Anatomy and Instructor in Clinical Medicine, 1894-7, etc. With 14 colored plates and 548 other illustrations. Philadelphia: P. Blakiston's Son & Co., \$10.

While, nominally, a fourth edition, this virtually is a new book. Recent advances in the field of internal medicine make it no longer possible to cover the subject of medical diagnosis in a pocket manual. Embracing all that is practical and of proved value to a student and practitioner in modern diagnostic methods, the author presents an impressing looking volume of 1,300 pages, containing 14 colored plates and 548 other illustrations. The outstanding characteristic of this volume is the systematic arrangement of the text. Twenty-five years of experience as a teacher have enabled the author to develop a strikingly effective mode of presenting his subject, to properly place emphasis,

and to repeat judiciously here and there information which customarily offers peculiar difficulties to the average student. A book on diagnosis which in subject-matter and presentation serves best the student, on the other hand, must necessarily prove useful also to the practitioner who remains a student, in attitude and spirit, of all medical progress.

THE DISPENSATORY OF THE UNITED STATES OF AMERICA. Twentieth edition. Thoroughly revised, largely rewritten, and based on the ninth revision of the United States Pharmacopeia and the British Pharmacopeia, 1914. By Joseph P. Remington, Ph.M., F.C.S., late Professor of Theory and Practice of Pharmacy in the Philadelphia College of Pharmacy; etc.; Horatio C. Wood, Jr., M.D., Professor of Pharmacology and Therapeutics in the University of Pennsylvania, etc.; Samuel P. Sadtler, Ph.D., LL.D., former Professor of Chemistry in the Philadelphia College of Pharmacy, etc.; Charles H. LaWall, Ph.M., Associate Professor of Theory and Practice of Pharmacy in the Philadelphia College of Pharmacy, etc.; Henry Kraemer, Ph.G., Ph.D., Professor of Botany and Pharmacognosy in the University of Michigan, etc.; John F. Anderson, M.D., Directory of the Research and Biological Laboratories of E. R. Squibb & Sons, etc. Philadelphia: J. B. Lippincott Company, \$12.

It is a stupendous task to write and revise a book of this size and character. Being a complete encyclopedia of pharmacy, chemistry, botany, and therapeutics, its value obviously depends on the authority and reputation of those who have written it. The staff of experts who have collaborated in the production of this thoroughly revised and completely reset new edition cannot be excelled in this country. This edition, a volume of 2,150 pages, is distinctly superior to all its distinguished predecessors.

GYNECOLOGY. By William P. Graves, A.B., M.D., F.A.C.S., Professor of Gynecology at Harvard Medical School; Surgeon-in-Chief to the Free Hospital for Women, Brookline, etc. With 303 halftone and pen drawings by the author, and 122 microscopic drawings by Margaret Concrecree and Ruth Huestis, with 66 of the illustrations in colors. Philadelphia: W. B. Saunders Company, 1916, \$7.

In every special field of medicine among its many textbooks a few can be picked out, as a rule, which distinctly rank as the best. To further grade these selected few is a difficult, if not impossible, task. They all present the subject in a thoroughly satisfactory manner, but each shows distinct characteristics expressing the individuality of its author. Graves' new gynecology without hesitation will be placed among those classed as the best on the subject, and it certainly is distinguished by an individuality. No other author has ever presented gynecology in this particular form of three divisions. Part I, dealing with the physiology of the pelvic organs and their functional relationship to the general organism, is designed for the advanced special student and the general practitioner doing gynecology. Part II is written for the undergraduate student. It includes a description of all gynecologic diseases. Part III is devoted exclusively to the technic of gynecologic surgery. No other author has ever attempted to draw his own illustrations. The advantage of such a procedure is selfevident. If a writer, as the result of his studies and observations, has developed his personal views concerning the nature of certain pathologic conditions, or certain features of an operation, no one can better express his exact ideas than he himself when fortunately his proficiency in drawing equals his fluency in writing. While the superiority of this new work in this latter respect must be readily conceded, some doubts still can be entertained in regard to the advisability and practicability of the three divisions under which Graves presents his subject. Perusal of this volume, however, leaves no doubt that its author has succeeded in producing a work of singular interest and value to the gynecologist, who for a long time has been denied the pleasure of reading a textbook so full of individuality and so rich in suggestions.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

MAY, 1918.

No. 5

EDITORIAL.

THE NEW YORK CITY HEALTH ADMINISTRATION.

Of the many institutions and traditions of which the great city on the Hudson has a right to be proud, there is none other whose preeminence is so undisputed as that of the New York City Health Department. This extraordinarily efficient organization is to hygienists what the Mayo Clinic is to surgeons.

Yet this administration is, at the present time, the object of an attack whose cynicism is only equaled by its insolence.

The powers that hold the reins in New York City are in effect announcing that they will none of advisors, honorary self-sacrificing advisors, unless they are of the proper political color and (presumably) subservience.

One of the most remarkable achievements of the department has, without question, been its campaign of health education, as efficient in results as it has been economical in its working. This section of the activities of the Health Department has been singled out for especial attack. It is not clear why this should be so, unless the powerful proprietary medicine organization has a hand in this business.

It is not the part of a foreigner to lecture his hosts on their own domestic affairs, but it is surely unfortunate that so unedifying a spectacle should be staged at the moment when this country is giving so lavishly of its blood and of its treasure for the safeguarding of democratic institutions.

One may venture to prophesy that unless, in the meantime, Federal action makes an end of this situation, when the voters of New York return from the battlefields of Europe they will visit their wrath on Mayor Hylan and his band with a sternness and efficiency which will make those worthies wish they had learned at least more political sense if not political rectitude during their years of eclipse.

THE MINERAL CONSTITUENTS OF FOODS.

Though much attention has been paid to the analysis of food ash, of the relative importance of its different constituents, and of the forms in which they existed previous to the incineration, but little can be said to have been accurately ascertained. Still less was known of the necessity or otherwise of their presentation in the form in which they occur in natural foods.

The inevitable consequence of such ignorance resulted. Not only was much honest and sane if inaccurate theory built up on our slender knowledge, but colossal structures of quackery and pseudo-science flourished on the "mineral constituent" pabulum and, in particular, on the importance of a "natural" sometimes worded "colloidal" presentation.

The grosser bubbles have been pricked and a scientific datum surface reached in a research recently reported by Osborne and Mendel.¹ The object which these workers had in mind may be summarized in their own words, ". . . to replace hypothesis and speculation by experimentally established facts."

One method of arriving at the necessity or otherwise of the various inorganic constituents of food suggests itself at once, namely that of purely synthetic diets free from or containing a known amount of the constituent under examination. Hitherto, however, feeding experiments with purely synthetic diets have failed. The present workers have availed themselves of their own discovery, previously reported, that a relatively small amount of yeast added to diets composed of purified materials rendered the latter capable of maintaining growth and health. The quantity of the mineral constituent introduced by these minute necessary additions of yeast is insignificant. The same is true of the traces remaining in the purified constituents of the synthetic diets. To satisfy the most captious critics Osborne and Mendel publish a table giving the analysis of each of the diets used.

When one constituent or another was withdrawn from the diet care was taken, by adjustment of the remainder, to insure the maintenance of the acid-base equilibrium. The following is a summary of the results obtained:

The withdrawal of calcium and of phosphorus produced, as was to be expected, a slowing of growth. It seems that neither of these elements can be replaced by another. Apart from these two ions, calcium and phosphorus, the others seem unexpectedly interchangeable.

Growth can be maintained on remarkably small quantities of sodium and chlorine, provided the gastric juice is available for re-absorption and is not removed by a fistula.

¹Osborne, T. B., and Mendel, L. B.: The Inorganic Elements in Nutrition (Jour. Biol. Chem., April, 1918, pp. 131-139).

A complete withdrawal of sodium is not incompatible with the maintenance of health, but if potassium is also withdrawn the result is unfavorable. It is tentatively suggested that, in the absence of sodium ingestion, potassium is excreted and, if it is not replaced, the organism suffers. If sufficient potassium is supplied the sodium store of the body is husbanded; while if sufficient sodium is furnished potassium is tenaciously held.

The most striking conclusion of the authors is that dietetic deficiency of any of these mineral constituents can be made good by the administration of their ordinary salts. This result covers even the cases of calcium and phosphorus though, in respect of the latter, the authors employ the reservation “. . . aside from possible minute quantities.” It is not, however, of *minute* quantities that it has so frequently dogmatically affirmed that organic phosphorus is necessary in food.

THE GENERALIZATION OF DRIED MILK.

The problem of the clean milk supply is still with us and bids fair to increase in complexity with the increase in the size of the agglomerations of industrial population. With the same cause of difficulty there is an augmentation in the expense of transport, owing to the greater distances between the cow and the consumer.

A solution towards which the eyes of economists, hygienists, and milk-producers turn with persistent hope is that of the use of dried milk.

Among the valuable monographs on food problems which the English Local Government Board, under the stimulus and stress of war conditions, has published is one on this opportune subject.

The report, while duly critical, breathes a decided note of encouragement. The main advantages to be gained by the use of the dried product are fairly obvious. They are the greatly reduced perishability of the milk powder and its easy transportation.

The imperishability is, however, merely relative. Milk powder contains a high percentage of fat and this, even in the “dry” condition becomes in course of time rancid. While milk in this condition is perhaps not injurious, it lacks charm, as the French say.

Unfortunately that method of milk powder manufacture, the “spray” method, which affords a powder, whose resuspension and partial solution most closely resembles natural raw milk, is also the process whose product most rapidly becomes rancid.

Serious experimental evidence as well as experience in child welfare stations shows that the reconstituted milk lacks nothing of the essentials for the growth and health of the infant.

On the whole the outlook for the dried milk industry is decidedly favorable.

SOLDIER'S HEART.

Shortness of breath, pain in the chest, palpitation and giddiness, without organic disease of the heart, and with no usually recognized disease to account for these symptoms is the condition known as "Soldier's Heart," "Disordered Action of the Heart," or simply as "D. A. H."

The results of an inquiry into 5,000 cases of this condition in soldiers sent to a convalescent camp is published in *The Lancet* of April 13 last. The author of this study, Major Hume, in civil life Professor of Pharmacology in the University of Durham, claims no pathological entity for the cases grouped under the titles recited. The symptoms defining the group are, however, so predominant that, notwithstanding their probably diverse origins, the condition may, for descriptive and, indeed, for clinical purposes, be considered as an entity.

In some cases the train of symptoms was incidental to the convalescence from some acute infectious fever, in others the subjects had, throughout life, experienced similar troubles on putting forth unusual efforts, while in a third group the nervous strain of trench life was apparently responsible.

As to the relative incidence of these characterizing symptoms the following table, dealing with 1,000 cases, exhibits them in the order of their frequency:

1,000 CASES OF D. A. H. SUMMARY OF SYMPTOMS.

Symptoms	Percentage incidence	Symptoms	Percentage incidence
Pain in chest.....	76.8	Palpitation	35.4
Breathlessness	67.5	Precordial tenderness.....	26.8
Giddiness	40.3		

Pain.—According to Major Hume, the pain is probably the result of overaction of an overexcitable heart. The first attack is usually determined by some sudden effort or some mental shock: as other efforts and shocks accumulate their effects the attacks become more frequent, more severe, and longer, till they come to last hours at a time. The character of the pain in a typical case is stabbing and its position the apex: it interferes with breathing causing, therefore, cessation of work. The abatement of this attack is followed by tenderness over a variable area of the left chest.

Breathlessness.—The dyspnea was of various forms: rapid and shallow breathing was frequently seen, such as is familiar in hysteria, and much of the condition seems to be of neurotic origin. The majority of these patients do not show an increase of the breathing rate above the normal when at rest, but they become unduly breathless on exertion.

Vertigo.—Giddiness usually occurs on the resumption of the

erect posture after the recumbent. It is particularly liable to follow Swedish exercises in which this movement occurs; but it may result from simple exertion.

Palpitation.—Palpitation occurs in attacks whose duration may vary from 20 minutes to six hours. Many graphic records were taken and these showed, in the majority of the cases, a normal rhythm with a gradual slowing up of the beat as the attack passed off.

Tenderness.—More than a fourth of the cases had tenderness of the left side of the chest wall: the skin and muscles were tender to pressure and to pinching, but no hyperesthesia could be elicited by light touch. The area most commonly affected was around the apex; less frequently the third and fourth ribs and interspace were the seat of this symptom; sometimes the whole of the precordial area was affected.

Hume notes that the degree and extent of tenderness should be employed as a guide to the amount of therapeutic exercise to be used. Moreover the persistence of tenderness after a course of exercises is an unfavorable prognostic indication.

In addition to these major symptoms, there were a number of others which occurred with sufficient frequency to be mentioned. These were: syncopal attacks, with more or less complete loss of consciousness; exhaustion; insomnia; irritability and "dissatisfaction with themselves and the world" (is this not "*Le cafard*?"?).

Physical Signs.—The heart rate, taken on a rested patient in the erect posture, showed an acceleration in all but 11 percent of the cases. This increase disappears during sleep and becomes more marked on taking exercise. Moreover the hearts of sufferers from D. A. H. return to their usual rate more slowly after exertion than do those of normal persons. It was found that if the interval between the cessation of the exertion and the return to the previous rate exceeded three minutes this was of unfavorable prognosis.

No enlargement of the heart could be detected in this series of cases. In the absence of such enlargement, no importance was attached to the systolic murmurs which were present in some two-fifths of the cases.

The blood pressure was found to be raised, but in the absence of controls on other cases exposed to the same conditions but not suffering from D. A. H., the importance or otherwise of this sign could not be weighed.

Peripheral cyanosis is common as is also excessive sweating.

No significant findings in the urine are reported.

As regards the nervous system, the commonest physical signs are tremulousness and exaggerated knee-jerks.

Treatment.—Treatment is by carefully adjusted exercises, combined with the strong adjuvant effects of moral suasion and en-

couragement called for by the neurasthenic condition of so many of the patients.

Under these measures about 60 percent. of the cases are fit to return to full military duty in a space of six weeks. Of the remainder, some twenty percent are able to undertake work in the army in France if provision is made for their being allotted tasks of a suitable nature. The phrasing of this statement in the original is as follows: "It would be of great advantage to the individual and to the army if those who are considered to be unfit for general service could be allotted to the work for which they are mentally and physically fit." In this one detects an echo of the complaints of the French medical officers of the difficulties they had with the authorities in the matter of special duty allocation for the partially disabled, a difficulty which was conspicuous in the case of the sufferers from night-blindness. One seems to remember that the combatant branches declined to admit any distinction, at the actual front, between the wholly and the only partially fit. In this way either a hardship was worked or a unit was lost to the army.

After briefly reviewing the four chief etiologic theories, the endocrinic, the nervous, the toxemic, and the infectious, Major Hume declines to support any and rather seems to incline to a belief in a heterogeneity of causes acting, as was said at the outset, either on the naturally unstable or on those whose normal stability has been overcome by the shocks of war.

Such a brief abstract as this can do but scant justice to the original which deserves careful study by all who will be coming in contact with soldiers suffering from this little understood though historically famous condition of "Soldier's Heart."

ORIGINAL ARTICLES.

ACCIDENTS AND COMPLICATIONS OF FISTULA OPERATIONS.

By CHARLES J. DRUECK, M.D.,

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DISCHARGE OF INTESTINAL CONTENTS OVER THE OPERATIVE FIELD.

This is one of the most annoying accidents during a rectal operation. A large sponge should be prepared and passed into the rectum to provide against this, but with even this protection fluid will sometimes be forced through. To prevent this accident the bowels should be thoroughly cleansed the day before operation and an enema given not less than six hours prior the hour of operation.

When the field has been soiled the operation must be stopped, the sponge plug removed, the rectum irrigated with sterile water or normal salt solution, a new plug introduced and the wound thoroughly cleansed.

HEMORRHAGE.

Hemorrhage during fistula operations need not be serious. If an artery be cut high in the rectum it should be grasped with a hemostat and a ligature thrown around it. If the ligature cannot be fastened a couple of sutures may be passed beneath the vessel and the wound closed. If that cannot be done the hemostat may be left in place for twenty-four to thirty-six hours. Some operators depend on packing to control bleeding and if carefully placed this is usually satisfactory. I use very little packing but prefer the other mentioned methods. Diffuse oozing may be checked with saline compresses held against the surface. All oozing and excessive hemorrhage must be controlled before the dressings are applied and until so controlled the patient must be kept under the anesthetic.

Hemorrhage is particularly liable to follow operations performed under local anesthesia. The first effect of cocaine is to contract the arterioles, which lessens the hemorrhage during the operation, but the paralyzing after effect makes secondary hemorrhage a danger, as the parts sometimes bleed excessively. Therefore it is well for patients who have submitted to operations under cocaine to remain quiet for one or two hours afterwards, until the

after effects of the drug wears off and the parts regain their normal tone.

Styptics, such as alum or perchloride of iron, are undesirable. The clot thus obtained is fragile and easily displaced at subsequent dressings and these agents accomplish nothing but what is better met with compresses or packing.

If ligatures have been applied the subsequent dressings must be carefully handled so as not to slip the ligatures off and cause secondary hemorrhage.

ANESTHESIA.

It should be remembered during rectal surgery that when the sphincters are stretched deep respirations are excited, and the anesthetic mask should be removed at that time or otherwise there is danger of too much anesthesia being suddenly inhaled and overcoming the patient.

In nearly all rectal operations temporary retention of urine occurs as a result of the manipulations and trauma which causes edema and congestion of the periurethral tissues. This swelling in turn constricts the urethral lumen. Sometimes retention is caused by spasm of the compressor urethrae and the neck of the bladder. Branches of the long pudendal nerve supply both the sphincter and the compressor muscle. In all operations upon the anterior quadrant of the rectum there is danger of injuring the urethra. As a result of this swelling the urethral lumen is constricted to such an extent that it may be impossible to introduce a soft rubber catheter into the bladder and a silver catheter may be needed. Both types of catheters should be at hand. Repeated efforts should be made by the patient to urinate voluntarily before attempting to catheterize him. Some men patients must get on their feet to urinate. It is well to wait twelve hours after operating before catheterizing unless the patient suffers from distention of the bladder. Do not wait too long, as cystitis and atony of the bladder may follow prolonged retention. Firm packing of the rectal wound may cause retention of urine and may also make the passage of the catheter impossible. In such a case the packing must be removed when not infrequently the patient can urinate without help. It is well to give urotropin, 60 to 100 grains daily for two days before all rectal operations because catheterization is likely to cause sepsis.

INVOLUNTARY DEFECATION.

If the colon has not been well emptied before the operation the patient will have an urgent desire to defecate as soon as he recovers from the anesthetic; or the bowels may move involuntarily before he is awake. In such case when the wound has been soiled, the whole anal region and buttocks should be thoroughly cleansed, care-

fully dried, and fresh dressings applied. When the patient having recovered consciousness, complains of repeated desire to defecate, he should be permitted to do so or at least try once. If he has been properly prepared nothing will be voided or at most only a little gas or liquid, and he will be much relieved. If there has been a concealed hemorrhage, which has filled the rectum with blood and is causing the tenesmus, he will void clotted and free blood, and of course require immediate attention.

SHOCK.

Shock may follow any fistula operation, especially if the patient has suffered a long suppurative siege and also when the cautery has been used. This danger of shock is one of the chief reasons for not using the Paquelin cautery in extensive fistula. The loss of blood from operations performed with the knife is not nearly so likely to produce shock as is the actual cautery. The loss of blood cannot be replaced with hot saline rectal injections but must be given by hypodermoclysis or intravenous injections. Otherwise the treatment of shock and hemorrhage following rectal surgery is the same as laid down in all works on general surgery.

SEPSIS.

Acute sepsis following rectal operations may develop within a few hours. It seldom comes on later than the third day. It appears usually as a diffuse periproctitis, and the possibility of such sepsis renders it imperative that every antiseptic precaution be taken with rectal surgery. Another form of sepsis is that where secondary abscesses develop and in which prompt incision and drainage is indicated.

INCONTINENCE OF FECES.

Tuttle says "This condition has become a nightmare to the profession and a stumbling block to every layman suffering from fistula. It is the shibboleth of the charlatan by which he frightens the sufferer away from the regular surgeon and induces him to be content with palliative treatment rather than submit to an operation." Incontinence does not occur anything like as frequently as is generally supposed. It is quite unusual to have more than temporary incontinence unless extensive burrowings or multiple fistulous openings exist. Incontinence may follow dilatation of the sphincter but only if there is some underlying spinal or nerve disease, or if the perineum has previously been badly damaged. Oblique, irregular, or jagged incision of the sphincter, even though single, may result in such a vicious union of muscle ends that incontinence results. Transverse cutting of the sphincter is not likely to produce incontinence. The integrity of both sphincters is abso-

lutely necessary for the voluntary control of the anus. If the muscle is cut squarely across and the ends united again so as not to materially increase the muscle length there will be good control. But if a wide band of scar intervenes between the severed sphincter ends the muscle will not sufficiently contract to thoroughly close the anus. Oblique incision of the sphincter allows the divided ends to slide upon one another until the internal fibers of one end unite with only the external fibers of the other end and thus very much lengthens the muscle and is frequently followed by incontinence. When the sinus passes through the body of the external sphincter muscle an incision severs only the lower fibers. These may be left to close by granulations. But if the entire muscle is divided and the wound edges retract there is always some incontinence.

Treatment.—When the incontinence is only partial much relief is obtained with galvanic electricity and hot fomentations. These should both be tried before resorting to operative interference.

Operative Treatment.—The relief of incontinence depends upon our ability to reunite the severed ends of the sphincter. Our success also depends upon the amount of muscle destroyed in the original operation or the subsequent sloughing of tissues and also upon the length of time elapsed since the damage was sustained. The muscle cut and therefore unused will atrophy and in time is useless if reunited or it may have degenerated so much that it cannot be found. If much tissue has been destroyed the muscle fibers may be too short to be brought together. Usually, however, the fibers because of their imperfect position are too long to act and the indicated operation by taking out a V-shaped piece shortens and brings the ends into normal position. The mucous membrane is dissected from its base, thus exposing the sphincter fibers and a V-shaped piece, the base outside, the apex pointing in, containing the scar tissue together with only such of the sphincter muscle as cannot be spared is cut out. This cuts the muscle fibers squarely. The ends are now united with chromicized cat gut and a tension suture of cat gut or silver wire is passed through the skin and muscle at one-half to three-fourths of an inch away from the wound. This tension suture should be tied over a pad of gauze and retained for 5 to 7 days. After all, oozing is checked the mucous membrane is sutured back into place. None of it is to be destroyed. The patient should be confined to bed and the buttocks strapped together with a broad band of adhesive plaster to prevent accidental traction on the wound. The patient's bowels are confined for one week and are then emptied with an enema of glycerin, 1 ounce, and linseed oil 3 ounces. This enema is repeated twice daily until all hard fecal masses in the colon are removed. Then, but not until then, a laxative may be given. The wound must be carefully examined daily to be sure no infection or abscess is developing. Should an abscess occur it must be incised early and drained in such a direction, if possible, that the united ends of the sphincter will not be injured. If the sphincter has been divided

in more than one place this operation should be performed in several steps, repairing only one injury at each sitting. The second operation may be attempted a month after the first.

Narrowing of the anal outlet by plastic operation will greatly benefit the patient but the muscle function cannot be restored. In such a case a buried kangaroo tendon is passed around the anus at the level of the upper border of the external sphincter and tied firmly upon the index finger introduced into the anus.

PROLAPSE OF HEMORRHOIDS AND MUCOUS MEMBRANE.

Sometimes following a fistula operation, because of the stretching or cutting of the muscle or of the tenesmus afterwards, there results a prolapse of internal hemorrhoids or of the anal mucous membrane. If this mass falls into the wound it will retard or prevent healing. This procidentia is usually only temporary and is relieved by astringent ointments and local applications of hot fomentations. If the prolapsing tissue is removed there is danger of its becoming infected, if the abscess and fistula are recent. In such a case it had better not be removed unless it is situated just above the angle of the wound, when it necessarily must be excised. In chronic fistula where there is very little suppuration the hemorrhoids may be removed.

PROTRACTED SUPPURATION AND EXTENSIVE BURROWING.

If, after a careful operation for fistula, suppuration continues, it is usually due to some underlying constitutional disturbance as syphilis, Bright's disease, diabetes, cardiac disease, or anemia. These conditions should all have been looked for before an operation was performed. Usually where any of these exist no radical operation should be attempted but our efforts confined to relieving the patient by enlarging the external opening enough to provide free drainage.

If burrowing continues after the fistula operation it is evidence that some small focus has been overlooked or a branch not laid open, or the dressings have been packed too firmly and drainage prevented. When it does occur the burrowings must be promptly and freely laid open their full length. Goodsall says, "The onset of pain in the wound later than eighteen hours following the operation is suggestive of extensive burrowing. This pain is throbbing in character, associated with chill, fever, and swelling near the wound."

If the wound is not carefully dressed each day, the wound edges may unite earlier than the deeper structures and a cavity be left within. This should be prevented rather than cured, but if it occurs the wound must be promptly reopened with the probe, the finger, or if need be, incised with the knife. This accident can be protected at the time of operation by trimming off the skin or mucous membrane edges for one-fourth of an inch on either side of the wound.

OBSERVATION ON UMBILICAL HERNIA.

By L. SEXTON, B.S., M.D., New Orleans, La.

Three percent of all hernias are of the umbilical variety. They are most usually caused by intra-abdominal pressure in the adult, while in infants it is from lack of closure of the abdominal ring; whooping cough, phimosis, straining at stool, or urination, all increasing the intraabdominal pressure in the child, thus preventing the closure of the umbilical ring. The congenital umbilical hernia is caused by lack of development of the abdominal muscles and the failure of the umbilical ring to close. The intestines may prolapse with the cord as a bulbous mass, which should always be reduced before the cord is ligated, lest a portion of the intestine be included in the ligature. The condition is rare, occurring about once in ten thousand infants. The umbilical hernia of the adult contains either omentum, small, or large intestines, which have protruded through the abdominal ring and a split through the *linia alba*. Oft repeated pregnancies and straining during delivery can be placed as the most common causes of umbilical hernia in the female. Females are twice as liable as males to this form of hernia, which are usually irreducible. The anatomical parts of umbilical hernia are the same as in others constituting neck, sac, and body, but the sac is not so well defined in umbilical as in other hernias because the peritoneum forming it is often not distinguishable from adhesions with other tissue. The skin over the top of the hernia becomes thinner and attenuated with the age and pressure of the hernia. The tumor may be round, smooth, or lobulated. In older persons, there is no such tendency for the rings to close as in children from the fact that increasing fat, hard labor, atrophy of the tissue from pressure, straining and the further fact of the omentum becoming adherent to the abdominal ring. In long standing cases incarceration and strangulation is a frequent complication. There is heavy dragging weight connected with the tumor with colicky pains if there is any twisting or strangulation of the bowels. This strangulation may be intrasacular by the intestines being twisted or caught in the inflammatory process. The only permanent means of relieving these acute abdominal symptoms is by an operative procedure. When patients will not submit to an operation, trusses, pads, suitable abdominal bandages, rest in bed, and purgation may temporize, until the consent of the patient can be gained for the radical cure of the case. The average intelligent patient will not hesitate long in coming to this conclusion if the merits of

the operation are properly presented. Increased obesity from sedentary habits with constant dragging pains from omental adhesions are great inducements to the patient to be relieved of the hernia. It is the irony of fate that nearly all umbilical hernias occur in obese patients and to correct this condition and avoid operating in the bottom of a well of fat, in some cases four inches deep, it is therefore advisable if the case is not strangulated or suffering severe pain to use a month or two in reduction of fat and preparatory treatment before the operation is undertaken. From twenty to forty pounds can be taken off of the largest patient, who is willing to assist the doctor in reducing his or her avoirdupois, and getting into proper shape for an operation by avoiding rich soups, salmon, blue fish, salt fish, pork, veal, sausage, hashes, fats, potatoes, macaroni, oat meal, hominy, rice, beets, carrots, turnips, puddings, pies, pastries, cakes, sugar, sweets, milks, cream, malt or spirituous liquor, beer, sweet wines and champagne, and in fact reduction of all diet by one-half with light exercise and daily purgation by such foods as dates, apples, prunes, raisins with pulverized senna, milk of magnesia, agar, or other purges, which tend to the absorption of gases and nonirritation of the bowels. Much of the outer layer of fat can be absorbed by wearing a tight bandage around the abdomen. By this reduction of food and purgation, the blood pressure will be reduced, kidneys and liver relieved of an overworked condition and the operative chance of the patient much improved.

Treatment.—In infancy the tendency of all unnatural openings is to close up. If the child is circumcised for phimosis, the constipation regulated, by diet or medicine, cough relieved, and intra-abdominal pressure reduced, many cases in children may be relieved by the use of abdominal bandages and support and by the proper application of wide Z. O. strips so applied as to assist in the closure of abdominal rings and the reduction of intraabdominal pressure. All of these methods if given a fair chance for a year or even more with the intelligent assistance of the parents or nurse will cure many cases. Others will need operative procedure, the same as in the adult. Before any operation, patient should be kept in bed on a very spare diet, thoroughly purged with an abdominal supporter pressing upon the hernia to try and reduce as much of the mass as possible before operating. This reduction of the hernia may sometimes be helped by elevating the foot of the bed and the application of ice bags relieving the tumor of as much blood as possible. After the usual antiseptic precautions, a transverse elliptical incision is made around the hernial tumor to the base; pushing back the surrounding tissue for two inches from the hernial sac, exposing the aponeurosis of the recti and opening the sac. The neck of the sac on the side is incised by a circular cut over the

finger, exposing the contents of the sac and reducing any intestines after separating from all adhesions with the omentum. The omentum is then ligated in segments in order to insure hemostasis. The edges of the sac should be clamped to prevent its receding into the abdomen; and the omental mass is then cut away. The most usual adhesions of the omentum are found at the upper margin of the tumor, and around the hernial ring, hence the sac should be opened at the side of the tumor, with less risk of danger to the patient. The adhesions can be broken up by the insertion of a finger around the ring and sweeping it gently from one side to the other. As a matter of course any intestines, which may be abraded by this separation, should have the raw surfaces covered over by Lembert-Czerny sutures before returning them into the abdomen. Be exceedingly careful that all bleeding is stopped before dropping the omental stump back into the abdomen. A flap splitting incision is made through the aponeurotic and peritoneal structure for from one to two inches according to the size of the umbilical opening. The peritoneum being separated from the surfaces of the flap. Chromicized mattress catgut sutures are inserted two inches above the upper edge of the umbilical ring; the same suture firmly grasping the lower margin of the flap. The lower flap is then drawn up by this suture from one to two inches according to the size of the patient, making a double covering for the ring, and taking the slack out of the peritoneum. The upper flap of the aponeurosis is then drawn down and sutured by catgut to the aponeurosis of the ring below. In inserting the mattress suture a large bite should be included in the loop so as not to cut out from pressure in the inflammation which follows. The lateral muscles and aponeurosis are closed in the same way by sliding one side above the other when it is possible, thus covering the opening with four layers of tissue. The less the tissue is handled in any operation the better for the patient, but especially is this true in an operation where any subsequent infection means the return of the hernia. Hemorrhage from small vessels should be controlled by clamping torsion, using a few ligatures as possible. It must be remembered, however, that haematoma will become infected just as likely as the ligature, so all bleeding must be stopped before the wound is closed up. After the operation is finished, before closing up the incision, we usually wipe it out thoroughly with half and half tincture of iodine and alcohol to prevent sepsis. We think that the overlapping of the muscles and aponeurosis from the sides when it can be done reinforces the peritoneal flap very much and renders the return of the hernia less probable. It is more important to approximate the aponeurosis than the body of the muscle, in order to prevent the recurrence of the hernia. After the muscles and sheath have been sutured, the adiposed tissue and the skin should be brought in close

apposition by deep catgut sutures. A small drain may be left in the corner of the incision for a short time if there is enough effusion to justify it. A suitable dressing with an abdominal bandage is then applied and the patient confined to bed for three weeks or a month as the further treatment of the case. For some time after the operation the patient should eat no gas-producing foods such as hot bread, potatoes, peanuts, starches, and sweets, but should keep the bowels gently open with alkaline gas absorbing laxatives. We have recently operated and relieved two large umbilical hernia in women who have borne many children. They were treated and operated on upon the above plan and were relieved of the embarrassing and uncomfortable hernia. The technic of the operation was very similar to what one sees in the Ochsner and Mayo Clinic.

REPORT OF A CASE OF IDIOSYNCRASY TO QUININE AND UREA HYDROCHLORIDE.

By COLLIER F. MARTIN, M. D.

In reporting this case it is not my intention to cast any reflection upon the use of this valuable drug as a means of treating internal hemorrhoids by injection, but simply to place on record one of the possible, although remote, dangers we may expect to encounter in using this, or many other drugs or serums. Many cases of idiosyncrasy to quinine have been reported in medical literature, more of them in the old days when quinine was used routinely. Of late years this drug has not been so popular with the profession; consequently few cases have been noted. To those of us who have not employed quinine very often, the unexpected occurrence of toxic symptoms comes as an unpleasant surprise.

On March 10, 1917, I examined a young lady of 23 years of age, a stenographer by occupation, who was suffering with an anal fissure and some small internal hemorrhoids. To relieve her acute pain, I administered some nitrous oxide and divulsed the sphincters. She had no further pain, and by March 23rd the fissure had entirely healed. On this date I injected a small hemorrhoid with 3 m. of a 10 percent solution of quinine and urea hydrochloride. Why I used this very small quantity I do not know, except that the hemorrhoid was very small. She left the office, and returned in about five minutes, saying, "Doctor, you used quinine on me. The last time I took some, it nearly killed me." I asked her how she felt, and she said she felt a numbness in her hands and feet. As the symptoms were not alarming at that time, I told her she had better return home, and call in her family physician, who had referred her to me. Instead of doing this, she went back to her office work. Upon arriving there, she collapsed, probably with an ordinary fainting spell, but suffered somewhat from shortness of breath, and swelling of hands and feet. Her hands were so badly swollen that her gloves had to be cut off. She was sent home immediately, and put to bed under the supervision of her family physician. Aside from the swelling of her extremities and the development of a urticarial rash, associated with intense itching, which covered her from head to foot, she had no alarming symptoms. She stayed home for two days, after which time the symptoms all subsided. She told me that her feet were so swollen that she felt as if she were walking on round cushions, the sensation being somewhat like pins and needles sticking in her. Every time

she has visited my office since then, she has always prefaced her remarks by saying, "No quinine today, please."

It is rather hard to say exactly the process involved in these cases of drug irritation. The condition is probably closely allied to anaphylaxis, seen when administering serum treatment. We know that quinine is not the only drug which produces unpleasant symptoms in susceptible individuals—belladonna, opium, and cannabis indica are some of the more common offenders in this direction. As a rule most patients, if they recover from one attack of this type, are so keenly alive to the disastrous and unpleasant consequences, that they warn the physician not to employ them. This is really the third time that this young lady has passed through the experience, every time having had pronounced symptoms from very minute doses of quinine. The case simply illustrates how easily we can get into trouble if we are not alert. Of course, many of our cases, should we ask them if they can take quinine, would say, "No," even though they really had no special idiosyncrasy to quinine. The person who has suffered from the toxic symptoms will either tell you without asking you, or describe their symptoms so vividly that you will know they are telling the truth. Personally, I feel that the use of quinine and urea for treating internal hemorrhoids is a valuable addition to proctology, but I will try to find out before using it, if any special contraindications exist.

CUTIS VERTICIS GYRATA—REPORT OF A CASE.

By FRED WISE, M.D., and OSCAR L. LEVIN, M.D.

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A peculiar anomaly of the scalp was demonstrated by Jadassohn before the Ninth Congress of the German Dermatological Society, held at Berne. The patient was a man of forty years, in whom the scalp on the back of the head was arranged in irregular folds, varying from three-quarters to one and a half cm. in width; laterally, these folds were more or less vertical in their arrangement, while they were more irregular and oblique in the median part. In all other respects the scalp appeared to be normal, and the peculiar condition was discovered accidentally. This heretofore undescribed condition was considered by Jadassohn to be an anomaly of development. In 1907, Unna described three more cases who presented a furrowing of the scalp over the vertex and back of the head, simulating in appearance the furrows and convolutions of the cerebrum. He named the condition, *cutis verticis gyrata*. Following Unna's publication, the literature contains records of a number of similar observations, viz.: 1908, von Veress, eleven cases seen in Marschalko's clinic. 1909, Audry, one case. 1909, Pospelow, three cases. 1910, Bogrow, one case. 1910, Vignolo-Lutati, one case. 1912, Vörner, one case. 1912, Yamada, one case.

The affection has been observed only in adult men. There may be from three or four to a dozen or more furrows and corresponding convolutions implicating the vertex and back of the head. Various hypotheses have been offered with regard to the etiology. Some look upon the affection in the light of a nevus developing in adult life; others consider microorganisms to be the causative factors, provoking an inflammatory process in the affected regions; still others explain the condition as being due to a congenital tendency to the formation of furrows or grooves, the implicated portion of the scalp sometimes becoming the seat of secondary microbic invasion.

The cases of Jadassohn and Unna were reported without clinical histories referring to possible etiological factors. In the first case of von Veress, the patient had a recently acquired syphilitic infection and gave a history of scalp disease in childhood. In von Veress' second case, the young man had had syphilis for about a year, but there had been no affection of the scalp preceding the malformation. In Pospelow's third case, the patient gave a history of syphilitic infection eight years prior to the scalp affection;

although he had a pustular eruption of the scalp at the time of his infection, the furrowing had been present for only a short time. The deformity of the scalp was first noticed after an attack of typhoid fever, in the ninth case of von Veress. In his fifth and sixth cases, the patients had eczema of the scalp in childhood. In his tenth case, psoriasis of the scalp was also present. Audry's case was preceded by an attack of furunculosis of the scalp. In Pospelow's first case, the man had been treated in the same clinic, five years before the furrowing appeared, for an eczema of the scalp. Bogrow's patient had erysipelas of the scalp two years



Cutis verticis gyrata.

before, and alopecia one year before he noted the furrowing. Von Veress' ninth case, Pospelow's second case and the case reported by Bogrow were bald. In all of the other patients, the hair was dense, coarse, black or dark-gray, with the exception of von Veress' eleventh case, a blond man.

Although Unna could find no evidence of preexisting inflammation, von Veress demonstrated a case of this affection in a man of forty, in whom the affected part of the scalp presented a purulent dermatitis, consisting of irregularly scattered, raised, perifollicular lesions, arranged in a gyrate manner. Here and there the hair was absent and replaced by small scars. In a case which von Veress examined histologically, he found that the hair follicles

and epithelial columns within the grooves, differed from those examined in the skin between the furrows and that the connective tissue in the furrows was more dense; but there were no signs of inflammation. In another case, the skin of the furrows revealed a reduction in the size of the blood vessels and sweat glands and a complete absence of the sebaceous glands, the hair and the elastic tissue. In their place he found a grouped, cellular infiltration composed of lymphocytes and plasma cells, together with large numbers of mast cells. These findings convinced von Veress that the condition was preceded by inflammatory changes.

Oppenheim reported an instance (quoted by Vörner) in which the folds occurred on only one side of the scalp. In Vignolo-Lutati's case the folds were hairless, smooth and shiny, of hard consistence and somewhat painful. Signs of inflammation and of desquamation were absent. The follicles showed a dense cellular infiltration in the cutis and subcutis, the superficial strata being almost normal. The infiltration consisted of small mononuclear and plasma cells, with a few scattered giant cells, some of these being surrounded by epithelioid cells. At a distance from the infiltrated area, evidences of a beginning sclerosis were seen. The walls of the follicles were intact, but the epithelial elements of the cutis showed signs of degeneration.

Vörner described a case in which all evidences of an inflammatory character were absent. He believed that the case which von Veress examined histologically was probably one of folliculitis decalvans and that Vignolo-Lutati's patient had a form of dermatitis papillaris capillitii, in whom the accidental gyrate conformation of the lesions caused them to be confounded with cutis verticis gyrata. In Vörner's opinion, inflammatory processes do not play a part in this affection.

CASE REPORT.

History.—The patient, Mr. H. P., aged 36, a Hebrew, was born in Austria and emigrated to the United States about six years ago. He lives in New York City and his occupation is that of an upholsterer of furniture. He is married and his wife and two children, who are in Austria, are in good health. A third child died at the age of thirteen months from pneumonia. His wife has had no miscarriages. His father died at the age of 60 and his mother at 51—the causes of death were not known. Two brothers and five sisters are alive and in good health. One sister died at the age of 50 from an unknown cause. The patient stated emphatically that no other member of his family had a condition of the scalp similar to his. When nine years of age he had pneumonia; otherwise he had no diseases of infancy or childhood. Two years ago he began to have a discharging ear and one year ago the right middle finger was incised on account of a suppurative infection. Infection with gonorrhoea or syphilis was denied. His habits are regular; he smokes eight cigarettes daily but no cigars or pipe, and drinks an occasional glass of beer. One month ago he applied for treatment at the Mount Sinai Hospital Dispensary, complaining of a pain in his left leg which proved to be caused by a syphilitic periostitis of the tibia.

Dermatologic History.—No reliable history could be obtained as to the exact time when the condition of the scalp began. His attention was first called to it about the age of twelve when a barber told him that his hair was difficult to cut. Previous to that time neither he nor any other member of his family had noticed the abnormality, and his mother informed him that it was not present at birth. The condition has persisted without showing any change. There are no subjective symptoms except that when the hair is allowed to grow for more than two weeks the scalp becomes tender and there is a slight tearing pain when the hair is touched. There is no history of trauma or inflammation of the scalp. He came to the dispensary for relief from the pain in his leg and not for treatment of his scalp; the condition being discovered in the course of the routine physical examination. No change has been observed in the lesion during the past month and his treatment consists of antiluetic remedies.

Physical Examination.—The patient is a male, of normal stature and weight, fairly well nourished and developed and of fair intelligence. The head is well formed, presents no scars and is normal in all respects except for the condition which involves the occipital region of his scalp. The eyebrows and eyelashes are normal and auburn in color. The pupils are equal, regular, central and react normally to light and accommodation. The nose, mouth and right ear are normal but the left ear presents a chronic purulent otitis media. The isthmus of the thyroid gland is palpable and normal in size. The chest is symmetrical and of normal shape and expansion. Fremitus, percussion and auscultation show the lungs to be normal. The heart is normal in size, its sounds are normal and there are no murmurs. The abdomen is normal in shape, moves freely with respiration, shows no tenderness or rigidity; the free border of the liver is just palpable and the spleen cannot be felt. There is a slight irregularity and tenderness of the tibia of the left leg, otherwise the extremities are normal. The cervical, epitrochlear and inguinal lymph nodes are slightly enlarged. The penis is well developed, the testicles are normal, the pelvis and mammary glands are masculine in character.

Dermatologic Examination.—Running transversely across the occipital region of the scalp are three gyrus-like elevations separated by two furrows. The gyri are parallel to one another, most prominent in the central portion of the scalp and tend to disappear at the lateral hair lines. The uppermost folds are not as marked as the lowest which looks as if the distal portion of the scalp were lifted off the skull. Corresponding to the gyri, the furrows are also parallel and the lower is deeper. This region suggests the appearance of the scalp of a bull-dog. On palpation it is found that there are really five gyri and four furrows, the upper two gyri being perceptible to touch only. The three gyri which are visible are elevated $\frac{1}{4}$, $\frac{1}{2}$, and 1 inch, respectively. The skin in the folds is thick, inelastic and movable on the skull; on the other hand, it feels thinned and more firmly attached in the furrows. The decline of the lowest fold stops at the posterior hair-line. The hair on this area does not differ from that on the rest of the scalp. There is no tenderness on pulling, pinching or pressing the hair or scalp. The hair of the scalp is dark brown in color, thick, tough, dry and cut short. There are a few gray hairs. The scalp is quite movable on the skull.

The skin and visible mucosæ are pale. The general growth of hair is normal and there are no defects of the nails.

A radiograph of the left tibia disclosed the presence of a periostitis. The Wassermann reaction of the patient's blood serum was 4 plus on the day of his admission.

A radiographic examination of the skull proved to be negative. The blood examination revealed the following: Hemoglobin, 60 percent; red blood cells,

3,688,000; white blood cells, 7,400; polynuclears, 61 percent; small mononuclears, 31 percent; large mononuclears, 7 percent; eosinophiles, 1 percent.

Examination of a piece of excised tissue from the scalp was unfortunately not made, the patient refusing to submit to a biopsy. However, it was clinically quite evident that an inflammatory process was entirely absent, supporting Vörner's views in this particular instance.

A careful survey of the literature leads the writers to believe this case to be the first example of cutis verticis gyrata to be recorded on this continent.

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THE HOSPITAL ANTIDOTAL CABINET, WITH A CHART INDICATING TREATMENT OF POISONING.

By JACOB ROSENBLOOM, M.D., Ph.D., of the Editorial Staff, Pittsburgh, Pa.

In all medical practice where time is an important factor nothing is of more importance than the prompt treatment of a case of poisoning. The writer has often noted that hospitals are poorly prepared for such emergencies. This paper contains a list of all the antidotes needed, together with a treatment chart that can be kept in the cabinet that contains these antidotes for the purpose of refreshing the memory as regards the method of treatment to be used.

It would be well for hospitals to have a cabinet containing these materials and labeled "Antidote Cabinet," where they may be readily obtained, thereby saving much time and possibly the life of the patient.

Following is a list of the materials that should be in this cabinet:

Amyl nitrite pearls.	Acetic acid.
Apomorphine tablets, 2 mg.	Tincture aconite.
Atropine sulphate tablets, 1 mg.	Oxygen tank.
Caffeine citrate.	Aconitine nitrate, 1/640 grain.
Chloroform.	Curare, 1/12 grain.
Cocaine hydrochloride tablets, 0.03 gm. (2 to 4 per quart).	Citric acid tablets, 5 grains.
Tincture of iodine.	Prepared chalk.
Copper sulphate, powdered.	Saccharated carbonate of iron (U. S. P.).
Lime water.	Oil of turpentine.
Magnesia, calcined.	Saccharated lime.
Potassium permanganate, 1 percent solution, to be diluted ten times.	Strong solution of ammonia.
Sodium sulphate.	Castor oil.
Spirits of ammonia, aromatic.	Zinc sulphate tablets, 10 grains.
Strychnine sulphate tablets, 2 mg.	Animal charcoal.
Whisky or brandy.	Potassium bicarbonate tablets, 5 grains.
Hypodermic syringe and needles.	Tannic acid tablets, 5 grains.
Stomach tube, with funnel.	Ammonia carbonate tablets, 5 grains.
Coffee extract.	Sodium bicarbonate tablets, 5 grains.
Eggs.	Morphine sulphate tablets, 1/4 grain.
Milk.	Digipuratum ampules, 1 c.cm.
Mustard.	Ether.
Olive oil.	Alcohol.
Salt.	Catheters.
Soap.	Tracheotomy outfit.
Starch.	A small battery and coil for faradic current.
Tea.	Colon tubes.
Vinegar.	Bleeding lancet.
Pilocarpine nitrate, 1/6 grain.	

Glass syringe with canula for trans-
fusion.

Lead subacetate tablets, 2 grains.

Physostigmine tablets.

Potassium bromide tablets, 15 grains.

Chloral hydrate tablets, 10 grains.

Chloroform.

Calcium sulphide, 5 grains.

Sterilized solution consisting of

Potassium bitartrate ...1	dram	} Give 8 ounces every 2 hours by mouth for mercury poisoning, alternating with 8 ounces of milk.
Sugar1	dram	
Lactose1½	drams	
Lemon juice1	ounce	
Boiled water1	pint	

Potassium acetate, 1 dram to 1 pint water, to be used as rectal drip in mercury poisoning.

TOXICOLOGICAL TREATMENT CHART.

A. POISON IS KNOWN.

I. ACIDS.

<i>Poison.</i>	<i>Treatment.</i>
Hydrochloric	} 1, chalk or sodium bicarbonate. 2, milk and egg or olive oil. 3, morphine. 4, brandy. Avoid syphon tube or emetic.
Nitric	
Sulphuric	
Oxalic and oxalates.....	} 1, chalk or charcoal in milk or water, or lime water or saccharated lime. 2, abundant milk. 3, enema of brandy and beef tea. 4, morphine. Avoid syphon tube or emetic.
Pyrogallie	
Acetic	
Tartaric	
Phosphoric	
Carbolic	} 1, wash out stomach with sodium sulphate solution or saccharated lime. 2, olive oil, milk, or white of egg. 3, sodium sulphate. 4, whisky or brandy. 5, ether. 6, warmth. 7, coffee. 8, catheter. 9, atropine.
Hydrocyanic (prussic).....	
Potassium cyanide and other cyanides	} 1, open air. 2, syphon tube or emetic. 3, cold douche to head and spine. 4, artificial respiration. 5, strong ammonia inhalation. 6, persalt of iron, then potassium bicarbonate (or dialyzed iron or saccharated carbonate of iron). 7, ether, hypodermically. 8, weak electric shocks to the heart. 9, atropine, 1/60 grain. 10, brandy hypodermically or by enema.
Essence of bitter almonds...	
Cherry laurel water.....	

II. CAUSTIC ALKALIES.

Caustic potash	} 1, citric acid. 2, milk, olive oil or white of egg. 3, diluents. 4, morphine. 5, brandy. Avoid syphon tube or emetic.
Caustic soda	
Caustic ammonia	
Caustic lime	
Chlorinated lime.....	} 1, syphon tube. 2, egg albumin. 3, olive oil and milk. 4, morphine. 5, brandy.

III. GASEOUS POISONS.

Benzine vapors.....	}	1, open air. 2, artificial respiration. 3, caffeine. 4, brandy and eggs. 5, elevate jaw.
Charcoal fumes.....		
Chlorine	}	1, open air. 2, artificial respiration. 3, moist air. 4, caffeine. 5, brandy and eggs. 6, demulcents. 7, elevate jaw.
Acetylene	}	1, open air. 2, artificial respiration. 3, cold douche to head and chest. 4, ammonia inhalation. 5, oxygen inhalation. 6, strychnine. 7, hot coffee. 8, digipuratum. 9, atropine. 10, camphor in oil. 11, friction and heat to extremities.
Carbon monoxide		
Carbon dioxide		
Coal gas.....		
Marsh gas.....		
Pit gas.....	}	
Sewer gas.....		
Chloroform	}	1, pull out tongue. 2, fresh air and fanning. 3, artificial respiration. 4, ether, hypodermically. 5, strychnine. 6, hot coffee. 7, brandy by rectum. 8, digipuratum. 9, amyl nitrite, inhalation.
Hydrogen sulphide.....	}	1, open air. 2, chalk and water or solution of chlorinated soda. 3, milk. 4, demulcents.
Alkaline sulphides.....		
Nitrous oxide.....	}	1, pull out tongue. 2, fresh air and fanning. 3, artificial respiration. 4, ether, hypodermically. 5, strychnine. 6, hot coffee. 7, brandy by rectum. 8, digipuratum. 9, amyl nitrite, inhalation.
Ammonia	}	1, cautious inhalation of hydrochloric acid. 2, fresh air and fanning. 3, artificial respiration. 4, oxygen inhalation. 5, ether, hypodermically. 6, hot coffee. 7, brandy. 8, strychnine. 9, digipuratum.
Bromine	}	1, open air. 2, aromatic ammonia inhalation. 3, artificial respiration. 4, oxygen inhalation. 5, caffeine. 6, brandy. 7, strychnine.

IV. INORGANIC POISONS.

Antimony, tartarate (tartar emetic).....	}	1, syphon tube. 2, tannin or strong tea. 3, white of egg in water, or milk, freely. 4, morphine. 5, brandy or ether. 6, strychnine. 7, digitalin. 8, warmth.
Antimony chloride (butter of antimony)		
Arsenic	}	1, syphon tube or emetic. 2, ferric hydrate, freshly prepared. 3, dialyzed iron or saccharated carbonate of iron. 4, milk and olive oil, barley water. 5, ice. 6, stimulants. 7, morphine. 8, warmth.
Arsenic fumes.....		
Sodium arsenate.....		
Fowler's solution.....		
Paris green.....		
Rough on rats.....	}	
Barium salts.....	}	1, sodium sulphate solution. 2, zinc sulphate. 3, caffeine.

Chromium	}	1, evacuate stomach. 2, calcined magnesia or chalk. 3, barley water. 4, apomorphine.
Bichromate of potash.....		
Chromate of potash.....		
Chromic acid.....		
Copper salts.....	}	1, milk and eggs, ad lib. 2, syphon tube. 3, milk. 4, demulcents. 5, morphine.
Verdigris		
Iodine and its compounds...	}	1, egg and milk. 2, syphon tube. 3, starch. 4, soda and milk. 5, demulcents.
Lead salts.....	}	1, syphon tube or emetic. 2, zinc sulphate or sodium sulphate, or diluted sulphuric acid. 3, milk, white of egg, or demulcents. 4, brandy. 5, warmth. 6, morphine.

*Poison.**Treatment.*

Mercury and preparations..	}	1, white of egg with milk or water, or flour and water. 2, syphon tube or emetic. 3, opium for pain and purging. 4, demulcents. 5, stimulants, hot coffee. 6, morphine. 7, give 8 ounces every second hour of the following solution by mouth: Potassium bitartrate, 1 dram; sugar, 1 dram; lactose, 1½ drams; lemon juice, 1 ounce; boiled water, 1 pint. 8, give 8 ounces milk every second hour. 9, lavage of stomach morning and night. 10, colonic lavage morning and night, using 4 gallons water each time. 11, give by continual rectal drip solution of potassium acetate, 1 dram to 1 pint water. 12, hot pack daily. 13, calcium sulphide, 5 grains, t. i. d.
Mercury chloride (corrosive sublimate)		
Ammoniated mercury (white precipitate)		
Mercuric oxide, red.....		
Mercuric sulphate (battery salts)		
Cinnabar (<i>vermilion</i>).....		
Silver nitrate.....	}	1, salt. 2, albumin and milk. 3, syphon tube or zinc sulphate. 4, milk.
Phosphorus	}	1, chalk and starch with ammonium carbonate. 2, syphon tube or emetic. 3, copper sulphate. 4, zinc sulphate. 5, french oil of turpentine. 6, milk and eggs (avoid oils and fats). 7, caffeine. 8, morphine. 9, ammonia inhalation and open air.
Rat paste.....		
Match fumes.....		
Matches		
Potassium chlorate.....	}	1, evacuate stomach. 2, water and mucilaginous drinks by mouth. 3, hot fomentations to loins. 4, heat to extremities. 5, inhalation of amyl nitrite.
Potassium nitrate.....		
Potassium iodide.....	}	1, starch, milk and lead subacetate, 2 grains, repeated. 2, zinc sulphate. 3, demulcents.
Zinc chloride.....	}	1, milk and eggs, or egg albumin. 2, tannin. 3, demulcents. 4, caffeine.

Zinc sulphate..... } 1, soda and milk. 2, tannin. 3, demulcents.
4, brandy. 5, artificial respiration. 6, warmth.

V. ORGANIC POISONS.

<i>Poison.</i>	<i>Treatment.</i>
Aconite	1, syphon tube. 2, digitalin. 3, brandy. 4, strychnine. 5, atropine. 6, artificial respiration and friction. 7, recumbent position.
Aconitine	
Anemonine	1, charcoal. 2, syphon tube. 3, ether. 4, strychnine. 5, caffeine, warmth, artificial respiration.
Apomorphine	
Belladonna	1, syphon tube or emetic. 2, pilocarpine or morphine. 3, caffeine. 4, physostigmine. 5, artificial respiration. 6, stimulants, hot coffee, warmth.
Atropine	
Nightshade berries.....	
Benzine (liquid).....	1, wash stomach. 2, ether. 3, artificial respiration. 4, caffeine. 5, ammonia inhalation.
Brucine	See strychnine.
Cannabine (see also cannabis indica)	1, charcoal. 2, syphon tube. 3, chloral, per rectum. 4, amyl nitrite inhalation. 5, artificial respiration.
Camphor	1, evacuate stomach. 2, hypodermic injection of brandy. 3, inhalation of ether. 4, alternate hot and cold douches. 5, warmth to the extremities.
Camphorated oil.....	
Cannabis indica.....	1, syphon tube. 2, strychnine. 3, caffeine.
Cantharides	1, syphon tube, or, if throat blistered, apomorphine. 2, white of egg in milk or barley water. 3, stimulants. 4, morphine. <i>Avoid oils and fat.</i>
Chloroform (when swallowed)	1, evacuate stomach. 2, give 3 percent solution of sodium bicarbonate by mouth. 3, demulcents. 4, artificial respiration. 5, fresh air. 6, oxygen. 7, atropine. 8, alcohol. 9, ammonia. 10, digipuratum. 11, artificial heat.

<i>Poison.</i>	<i>Treatment.</i>
Cocaine	1, Charcoal. 2, syphon tube. 3, strychnine. 4, digitalin. 5, artificial respiration. 6, brandy. 7, amyl nitrite or ammonia inhalations. 8, warmth.
Convallaria	1, apomorphine. 2, tannin. 3, ether. 4, <i>keep supine.</i> 5, warmth. 6, caffeine. 7, aconite.

Colchicum	}	1, syphon tube, with milk or olive oil. 2 rectal oily injections. 3, morphine, repeated. 4, demulcents. 5, stimulants.
Croton oil.....		
Castor oil seeds.....		
Violent purgatives.....		
Creosote	}	1, wash out stomach with sodium sulphate solution or saccharated lime. 2, olive oil, milk or white of egg. 3, sodium sulphate. 4, alcohol. 5, ether. 6, warmth. 7, coffee. 8, catheter.
Lysol		
Coniine	}	1, charcoal. 2, syphon tube. 3, strychnine. 4, ether. 5, coffee, stimulants, warmth. 6, artificial respiration.
Conium		
Digitalis	}	1, apomorphine. 2, tannin. 3, ether. 4, <i>keep supine</i> . 5, warmth. 6, caffeine. 7, aconite.
Duboisine	}	1, physostigmine. 2, charcoal or tannin. 3, syphon tube.
Elaterium	}	1, syphon tube, with milk or olive oil. 2, rectal oily injections. 3, morphine, repeated. 4, demulcents. 5, caffeine. 6, digipuratum. 7, ether, hypodermically. 8, ammonia, inhalation.
Elaterin		
Ergot	}	1, evacuate stomach. 2, one drop croton oil by mouth, followed by warm drinks. 3, after the bowels have acted and the stomach has been emptied, give at intervals small doses of opium. 4, nitroglycerin, 1/100 gutta every half hour. 5, recumbent position. 6, heat to body. 7, friction to body. 8, inhalation of ammonia. 9, caffeine. 10, ether, hypodermically.

*Poison.**Treatment.*

Ether (when swallowed)...	}	1, evacuate stomach. 2, demulcents. 3, artificial respiration. 4, fresh air. 5, oxygen. 6, atropine. 7, brandy. 8, ammonia, inhalation. 9, digipuratum. 10, artificial heat.
Fungi (toadstool).....	}	1, syphon tube or emetic. 2, castor oil. 3, coffee. 4, artificial heat. 5, caffeine. 6, atropine. 7, digipuratum. 8, morphine. 9, brandy. 10, artificial heat.
Muscarine		
Gelesemnine	}	1, charcoal. 2, syphon tube. 3, coffee. 4, strychnine. 5, atropine. 6, artificial respiration. 7, hot and cold douches.
Guaiacol	}	1, syphon tube; wash out stomach with sodium sulphate solution. 2, olive oil, milk, or white of egg. 3, alcohol. 4, atropine. 5, caffeine. 6, ether. 7, heat. 8, coffee. 9, catheter.

Laburnum	}	1, evacuate stomach. 2, wash out stomach with coffee. 3, high colon irrigation. 4, epsom salts by mouth. 5, cold douche. 6, caffeine. 7, ether. 8, strychnine. 9, brandy. 10, ammonia inhalations.
Cytisine		

Lobelia	}	1, tannin. 2, syphon tube. 3, castor oil. 4, atropine. 5, ammonia, inhalation. 6, digipuratum. 7, artificial heat. 8, morphine.

Mineral oils—benzoline, paraffin, petroleum.....	}	1, evacuate stomach. 2, lavage with milk. 3, olive oil, abundant, by mouth, followed by lavage with milk. 4, ether, hypodermically. 5, caffeine. 6, strychnine. 7, demulcents.

Hyoscyamus	}	1, syphon tube or emetic. 2, pilocarpine. 3, morphine. 4, caffeine. 5, physostigmine. 6, artificial respiration. 7, hot coffee. 8, artificial heat. 9, ammonia, inhalation. 10, ether, hypodermically.
Hyoscine		
Homatropine		

Poison.

Treatment.

Morphine	}	1, syphon tube or emetic. 2, hot coffee. 3, potassium permanganate solution. 4, keep patient active. 5, atropine. 6, artificial respiration. 7, ammonia, inhalation. 8, apomorphine. 9, caffeine. 10, strychnine. 11, galvanism. 12, catheter.

Nitrobenzine	}	1, evacuate stomach and wash out with plenty of warm water to which is added 2 ounces alcohol to each quart. 2, ether, hypodermically. 3, strychnine. 4, ammonia, inhalation. 5, caffeine. 6, artificial respiration. 7, apply weak interrupted shocks to the chest wall by means of a battery. 8, alternate hot and cold douches. 9, atropine.

Nitroglycerine (glonoin)....	}	1, syphon tube. 2, atropine. 3, strong coffee. 4, artificial respiration. 5, warmth.
Nitrites		

Pennyroyal	}	1, apomorphine. 2, ammonia, inhalation. 3, artificial respiration.

Physostigmine (eserine)....	}	1, atropine. 2, tannin. 3, syphon tube. 4, strychnine.

Picrotoxine	}	1, evacuate stomach. 2, chloral, 15 grains every half hour to prevent or allay tetanus. 3, caffeine. 4, ammonia, inhalation.
Cocculus indicus.....		

Pilocarpine	}	1, atropine. 2, ether. 3, caffeine. 4, warmth. 5, morphine.

Podophyllin	1, apomorphine. 2, morphine, repeated. 3, olive oil. 4, opiate stupes.
Ptomaines (putrefying foods)	1, apomorphine or other emetic, or syphon tube. 2, olive oil and castor oil. 3, calomel, 5 grains, followed by saline purge.
Savin	1, tannin. 2, apomorphine. 3, morphine. 4, castor oil, if bowels have not acted.

*Poison.**Treatment.*

Solanine	1, evacuate stomach. 2, pilocarpine or morphine. 3, caffeine. 4, physostigmine. 5, artificial respiration. 6, hot coffee. 7, heat. 8, strychnine. 9, ammonia, inhalation.
Stramonium	1, syphon tube. 2, tannin. 3, morphine. 4, pilocarpine. 5, muscarine. 6, artificial respiration. 7, alternate hot and cold douches. 8, external heat. 9, brandy. 10, strychnine. 11, digipuratum.
Strophanthus	1, apomorphine. 2, tannin. 3, ether. 4, <i>keep supine</i> . 5, warmth. 6, caffeine. 7, aconite.
Strychnine*	1, charcoal. 2, apomorphine or syphon tube. 3, tannin. 4, potassium bromide. 5, chloral or chloroform. 6, amyl nitrite. 7, curara. 8, physostigmine. 9, artificial respiration.
Nux vomica	
Tobacco	1, tannin. 2, syphon tube. 3, horizontal posture. 4, fresh air. 5, strychnine. 6, atropine. 7, digipuratum. 8, caffeine. 9, ammonia. 10, cold to head. 11, warmth.
Nicotine	
Turpentine	1, evacuate stomach and lavage with milk. 2, enema. 3, plenty of water and demulcent drinks by mouth. 4, hot fomentations to the loins. 5, morphine.
Polishing fluid	
Veratrum	1, tannin. 2, evacuate stomach. 3, horizontal posture. 4, fresh air. 5, caffeine. 6, atropine. 7, strychnine. 8, digipuratum. 9, artificial heat. 10, morphine. 11, electricity.

VI. AMYL, ETHYL, AND METHYL COMPOUNDS.

Alcohol, ether	1, ammonium carbonate. 2, syphon tube or apomorphine as an emetic. 3, cold affusion.
Aldehyde	4, artificial respiration. 5, strychnine.
Butyl chloral	6, hot coffee. 7, catheter.
Paraldehyde	
Amyl nitrite	1, open air. 2, digitalin, repeated. 3, artificial respiration. 4, fanning. 5, strong ammonia inhalation. 6, strychnine.

Poison.

Treatment.

Amylene hydrate. See chloral.

Ethyl bromide	}	1, open air. 2, artificial respiration. 3, digitalin. 4, ammonia, inhalation. 5, caffeine. 6, strychnine.
Ethyl chloride		
Ethyl nitrite		

VII. OPIUM AND ITS PREPARATIONS.

Opium and belladonna (in combination)	}	1, syphon tube. 2, hot coffee. 3, inhalation of amyl nitrite. 4, strychnine. 5, physostigmine. 6, potassium permanganate.

Opium and chloral (in combination)	}	1, apomorphine. 2, ammonium chloride, internally, or ammonia inhalation. 3, atropine. 4, strychnine. 5, caffeine.

Opium or morphine.....	}	1, syphon tube or emetic. 2, hot coffee. 3, potassium permanganate. 4, <i>forced exertion</i> . 5, atropine. 6, artificial respiration. 7, apomorphine. 8, ammonia. 9, caffeine or strychnine. 10, galvanism. 11, catheter. 12, enema.
Chlorodyne		
Dover powder.....		
Paregoric		
Codeine		
Laudanum		
Heroin		

VIII. SYNTHETIC DRUGS.

Aniline	}	1, brandy. 2, ether or coffee. 3, warmth. 4, strychnine or digitalin. 5, artificial respiration. 6, recumbent position. 7, venesection; followed by saline transfusion.
Acetanilide		
Antifebrin		
Antipyrine		
Resorcin		
Phenacetin		
Phenazone		

Chloral	}	1, syphon tube. 2, strychnine. 3, warmth. 4, hot coffee, per rectum. 5, flicking. 6, digitalin. 7, artificial respiration. 8, ammonia, inhalation. 9, oxygen, inhalation.
Tetronal		
Chloralamide		
Chloralose		

Sulphonal	}	1, syphon tube or emetic. 2, stimulants, hot coffee. 3, warmth. 4, strychnine or digitalin. 5, artificial respiration. 6, recumbent position.
Trional		
Veronal		

B. POISON IS NOT KNOWN.

1, chalk. 2, egg albumin. 3, oil. 4, milk. 5, syphon tube. 6, brandy. 7, ether, hypodermically. 8, artificial respiration. 9, restoratives.

Jenkins Arcade.

POLIOMYELITIS AND EPIDEMIC MENINGITIS.

By D. M. LEWIS, M.D., Epidemiologist Board of Health, New Haven, Conn.

More exact diagnosis in these two conditions would undoubtedly clear up the epidemiology of poliomyelitis and consequently lead to its control. I have shown that during and especially at the end of an epidemic of the disease there are cases of epidemic meningitis called poliomyelitis without full investigation because the latter disease happens to be epidemic.¹ I have also shown that preceding the epidemic there are the same abortive manifestations of the disease as are a cause for the diagnosis during the height of the epidemic.² When then, the same manifestations may be remembered as being sporadic cases, it will be possible to show why epidemics may be out of season, and why epidemics are not necessarily imported from other communities. Based on the study of the epidemic of 1916, New York City shows that the earliest probable epidemic was in 1907 when, with 215 cases reported, they found at least 800 and probably 2,500 cases occurred. Examination of any incidence in Connecticut shows a report in the July, 1910, Bulletin of the State Board of Health that there was a frequency in New York City, Springfield, Pennsylvania and Iowa; that Meriden, Connecticut, reported 13 cases. In August there were 4 in Bridgeport, 6 in Hartford, 7 in Meriden. In September there were 4 in Bristol, 18 in Middletown, 10 in New London, and 2 in New Haven. In October there were 3 in New Haven, 4 in New London, and 3 in Willimantic. In November there were 2 in New Haven and the same number in Hartford. In December there was one each in West Haven and Putnam. With 163 cases reported in the state for the season, practically every town reporting cases in 1916 was represented at that time. Based on New York's figures there would have been the respectable number of little less than 2,000 cases. There were reported in the state in 1916 for a similar season, 935 cases. Further, in New Haven in 1911 there were three times the reported cases of 1910. The important point is this: while grippe and scarlet fever in adults were notable in the northern part of the state in early 1910, the same was notable in New Haven in 1911; in both instances before the poliomyelitis season was called attention to. When then the same manifestations, as has been said, are present in pre-seasonal poliomyelitis years in widely separated regions, but especially in different parts of even one state, and we can show that there are not only sporadic cases interim but that such are fatal cases, we shall reach bottom.

It was notable to me at the end of the poliomyelitis season that cases diagnosed as such in young adults were either out of town residents or infected out of town, and were evident cases of epidemic meningitis. There had been no frequency of poliomyelitis in one of the cities especially. There followed in that city and environs in the following months what has proven for the year a true epidemic of epidemic meningitis. Was the same true for this city? Of 27 cases diagnosed epidemic meningitis there were 14 non-residents with 9 deaths treated at the City Isolation Hospital. Of the 13 residents with 9 deaths, one was of a series of 4 fatal cases all in the same age from a neighboring town stringing along over one month's time period. One had had the disease in an epidemic of 1905. One was due to a carrier found in the house. One was infected as a late resident of the city mentioned as having an epidemic. Two were cases in adults of the fourth decade where



Poliomyelitis and epidemic meningitis.

no data was obtained at the time or afterwards. There was one similar in a young adult. There were 3 cases where, in children under age 5, the neighborhood and later cases showed clearly streptococcal infections. There was one adult where the history as well as two examinations of the spinal fluid from personal examination showed the case one of poliomyelitis, although the hospital, without investigation, returned the certificate as epidemic meningitis. There were 12 deaths reported from cerebrospinal meningitis the secondary cause being given in the majority of cases either a chronic middle ear or pneumonia. Of these 12 there were 2 where the diagnosis was definitely poliomyelitis. As being the hinge on which rests my argument as to unrecognized sporadic fatal poliomyelitis, one of the cases may well be related.

CASE REPORT.

J. W., female, age 2, admitted July 23, 1917, with diagnosis of cerebrospinal meningitis. Past history negative; previous illnesses in family none; July 22

complained of sore throat and stiff neck. The mother states that the patient had a high fever and did not vomit. For the previous three nights the child could not be touched without screaming, was wakeful and irritable. I was asked to see her on the 26th. At that time there was no retraction of the neck, absence of Kernig's or Babinski, no facial paralysis, no MacEwen. The buccal and pharyngeal membranes showed the suggestive deep injection with moderate edema of the pharynx; the tongue with a deep tenacious coating; there was distinct palpable cervical bilateral gland enlargement; absence of paralysis and tendon reflexes present and equal. There was notable irritability on handling. Pulse range from 124 to 130 and temperature from 102° F. to 104.2° F. Lumbar puncture on the 24th had been reported as clear fluid with absence of cell content. A second puncture on the 26th was examined by me and showed a clear fluid, slight reduction of sugar, a moderate cell content of predominant lymphocytes without demonstrable organisms. My diagnosis of poliomyelitis was agreed to but changed in the following few days to probable typhoid fever. During the four following days the pulse ranged to 150 and the temperature from 103° to 105°. The bedside notes varied from "Doesn't wish to be touched" and "Restless" to "Drowsy." On the 31st the pulse ranged to 160, the temperature to 105.6° and with one of 107.8° a note was made that the patient seems paralyzed in the throat and cries when moved. Death occurred that day, nine hours after a convulsion. A postmortem in the absence of the pathologist was done by an interne who on opening the skull found nothing to note, but made a smear from the brain. Examination showing a streptococcus nothing further was done. While unfortunate from lack of complete details, the history and the accompanying illustration by Kellner of the Yale Clinical Laboratory are satisfactory. Beside the pleomorphic diplo-streptococcus the specimen shows figured at "A" varying sized yeast like bodies with frequent micrococcal content. I believe that such forms are an involution bacterial form as I shall show at a later date.

There are then the following apparent conditions and facts:

1. Grippe frequency is followed by corresponding later seasonal frequency waves of meningitis and poliomyelitis. This holds true during the past decade.
2. Sporadic cases of each disease occur during the interim apparently and satisfactorily account for future epidemic waves. Individual localities may have different time periods of such frequency waves.
3. Complete analysis, including the opportunity for post mortems on all sporadic cases of meningeal involvement, is very essential to a board of health, where the diagnosis is not exact in order to prevent the vain search for one type of carrier when another organism should be the one sought.
4. Physicians as well as boards of health must recognize that there is no season for sporadic meningitis; they must come to the definite basis of infecting organism as the essential basis for prevention.
5. The certainty of one and probably four deaths in 9 diagnosed as epidemic meningitis being poliomyelitis, and 2 out of 12 cerebro-spinal deaths also poliomyelitis speaks for closer study and more accurate diagnosis to prevent frequency as well as epidemics.

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THE ENVIRONMENT OF ANESTHESIA.

By J. R. McCURDY, M.D.,

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Time was—and not so many years ago—when the anesthetic as a part of the contemplated operation was given scant consideration; when it was looked upon as a sort of necessary evil, or was treated with carelessness or complete disregard; when the administration of the anesthetic was lightly relegated to any physician, nurse, or hospital interne who might be at leisure; when the discomfort and suffering of the patient, possibly his recovery from the anesthetic, and its effect as an element of shock were given little thought.

Any physician who participated in operating room work 15 years ago well remembers the old scene of the terrified struggling patient held down by two or three nurses, orderlies, and physicians, while the heroic anesthetist, steeled to his task, smothered his victim with a liberal heap of gauze or an Allis inhaler, and poured on his trusty ether until it bathed the patient's face, or his untrusty chloroform until someone called "time" for measures of resuscitation!

Indeed it is only within quite recent years that our surgeons have appreciated the importance of anesthetic and post anesthetic conditions, and have demanded more care and skill in the administration of anesthetics and have themselves given conscientious study to the subject. Many surgeons today will not permit any but experienced anesthetists to assist in their operations. The attitude of the public also is fast becoming a potent influence toward advancement in this branch of surgery, for the laity of this day and generation follow the doings of the medical profession much closer than in former years. The prospective patient for operation or his friends have learned that there are good anesthetics and poor ones, skillful anesthetists, and careless, inexperienced ones, and he is more and more frequently requesting and expecting expert attention in this department.

For all of this the surgical world, as well as the public, may be thankful, for operative mortality will undoubtedly be reduced as anesthesia advances. And by "anesthesia" I do not mean merely the administration of any given anesthetic agent, inhalation or other. Every anesthetic agent is a poison, and when introduced into the body is to a greater or less degree inimical to the patient's welfare, and antagonistic to his power of resistance to trauma or disease. This alone should command our utmost respect for such agents and stimulate us to apply to each and every case the best measures known to reduce such injurious effects to a minimum.

But it is not with anesthetics as drugs that we are at this time concerned, but rather with those extraneous influences psychological, physiological, and other which are usual and more or less constant accompaniments to the performance of an operation, and which have immediate or remote effect upon the condition of the patient.

Our chief concern as physicians—family physician, surgeon, and anesthetist, should be first, last, and always, the *welfare of the patient*, not the brilliancy of the operation—not the technique of the hospital—not the convenience of the anesthetist—but the best results, immediate and ultimate, for the patient operated upon.

It is a common saying among the laity that doctors and nurses are all “hard-hearted”—not meaning “cruel” or “inhuman,” but inured to suffering and pain, and hence unsympathetic. In some measure this is of course true, and we who spend much time in the atmosphere of hospitals and operating rooms are prone to become indifferent to emotions of fear or worry and to mental as well as to physical suffering. But to the *patient*, operation is a grave matter—often epochal in his or her life—certainly not an event to be lightly or frivolously considered.

Few, if any, patients come to the operating room without fear of the anesthetic. This may be present to the degree of an undisguised terror, or be concealed by outward appearance of tranquility, resignation or jocundity, but it is undoubtedly a very present emotion in 99 percent of patients. Many openly confess that they fear the anesthetic more than the operation—meaning, of course, the possibility of accident in either, and let us not forget that there is always some element of danger in every general anesthetic. Hence, in discussing with the patient this part of the proposed operation, it is both unwise and unavailing to deceive or bluff her or lightly brush the subject aside as of no importance whatever. Any expression of fear of an anesthetic should be met with assurance that particular care is given at the hospital to this feature.

Again, see to it that nurse, attendant, and friends avoid talking with the patient about her operation *or anyone else's*, for thoughtless remarks or innocent suggestions are quickly seized upon by the patient's anxious brain and perhaps magnified and interwoven into a veritable nightmare.

For the same reason it is better not to allow too much time between the decision for operation and date of its performance. Admission to the hospital should, however, be a full day before the time set, although the exact hour appointed need not necessarily be disclosed to the patient. This I consider important, because to a large degree it minimizes the mental and nervous shock and physical strain of a hurried trip to the hospital and necessarily hasty and insufficient preparation for the operation.

The preparation should be consummated with the least possible "fuss" or haste and with the greatest possible consideration for the patient's sensibilities and comfort, again at this time avoiding discussion of the coming operation or of others.

Now let us follow our patient from her room to the operating rooms and through the operation. In her passage through the corridors and on the elevator she may hear some thoughtless remark by nurse or doctor which will add some new doubt or fear to the multitude already crowding upon her. On leaving the elevator she may be confronted with evidences of operations;—other patients being hurried along on carriage or bed; nurses and doctors in sepulchral gowns scurrying to and fro; the moans or cries of patients recovering from anesthetic; the rattle of instruments; a glimpse of an operating room with operation in progress; the odor of antiseptics and anesthetics, etc.

In the anesthetizing room the patient may be left waiting her turn—left alone perhaps—on an uncomfortable operating table from fifteen minutes to two or three hours,—her imagination and fears running riot and stimulated by suggestive noises from without. The mere enforced waiting, when minutes seem hours to the patient, constitutes a serious strain upon her nervous system. This picture is not in the least overdrawn, as the testimony of many, many patients and of neurologists will bear witness. True, there are many patients whose temperament and fortitude is such that some or all of these influences do not produce in them the potent psychological effects that are produced in so-called "nervous" patients. But the former deserve our care and consideration equally with the latter.

All these influences—extraneous and imaginative—tend to increase many fold the fears of the patient, or at best add to her mental perturbation and directly or indirectly increase the factor of nerve shock. From the anesthetist's viewpoint a condition of mental chaos, distress or fear is decidedly undesirable, rendering the induction of anesthesia longer and more troublesome, perhaps boisterous and considerably more distressing to the patient. But more than this, and far more important to the surgeon, is its effect as a contributory factor in the general element of anesthetic and surgical shock and its influence upon recovery. The excellent work of Dr. George W. Crile on shock has presented this feature most convincingly to the profession. His extensive experiments, as detailed in his well-known book on anoci-association prove "that the brain is definitely influenced, even damaged, by fear." Keen in his "Surgery" says: "When the fears of a patient who is conscious are developed into the terrors of subconsciousness, in which the patient imagines the most frightful accidents are taking place, it can be readily understood that profound nervous shock is produced."

Another author says: "Where but little is required to turn the scales toward the side of death, unquestionably fear may sometimes lead to fatal results through psychical shock—the successful outcome of an operation sometimes materially depends upon the tranquilized state of the patient's mind. Psychical shock, although rarely fatal of itself, may readily prove a determining lethal factor in a patient with unsound organs, who is also subjected to the physical shock and loss of blood of an operation."

The anesthetist, by proper manner and management, can to a large degree control the patient's mental activities and influence her psychological state materially. But the best efforts of the anesthetist may be set at naught by careless or harmful management of the patient prior to the time he takes charge.

The pre-anesthetic administration of alkaloids and other medicaments in the preparation of the patient is deserving of our careful study and attention. This subject is too broad for our consideration at this time, but I cannot refrain from protesting against the haphazard, indifferent methods, or lack of method, all too prevalent among our surgeons. In hospital practice it seems necessary that there be given a regulation hypodermic injection and certain other routine preparation, these of course, being subject to the wishes of the surgeon. Whether or not morphine shall be used, or scopolamine, or any other narcotic, whether 1/100 or 1/150 grain of atropine shall be given, and at what interval before anesthesia; whether the bowel shall be thoroughly purged by drugs, or carefully emptied by enemata alone; whether the patient shall be starved, or nourishment kept up until time of operation—are all questions open to differences of opinion. The point I wish to emphasize, and the ideal practice to be striven for, is that the pre-anesthetic treatment and preparation of *every* patient be considered and executed *for that patient herself, with the advice and consultation of the anesthetist*. The surgeon should think of the anesthetist as his consultant and assistant, sharing with him the responsibility of the case (as he does in fact), realizing that the patient's life and ultimate recovery from operation is of keen interest to the anesthetist, and to a large degree dependent upon his skill.

Again the selection of the anesthetic agent is of prime importance, and should be considered in consultation with the anesthetist, for the best interests of the particular patient, and pre-operative treatment ordered to suit the anesthetic agent chosen. In general there may be laid down indications and contraindications for each and all anesthetics in use, and these should be known to the surgeon as well as the anesthetist. But individual study and treatment of each case is the safest and most scientific *modus operandi*.

Let us now consider briefly our patient in general anesthesia undergoing an operation.

The question of depth or degree of narcosis under which to operate is one in which, it seems to me, there should always be consultation and liberal minded agreement between surgeon and anesthetist—"team work" as it were. Any conscientious, careful anesthetist will keenly appreciate the surgeon's courteous inquiry as to whether the patient is ready for incision, or the surgeon's thoughtful deference to his judgment whenever, in the course of an operation, it becomes desirable to deepen the narcosis, presuming of course, in this as in all my argument, that the anesthetist is a competent one and a physician.

Few surgeons are versed in theory and practice of anesthesia, and moreover the careful surgeon has his entire attention centered on the operation itself, and *cannot* know the patient's anesthetic condition every minute. As to the proper depth of narcosis there is again much difference of opinion. Personally I do not believe it is justifiable, and is rarely imperative, to reduce the patient to a condition of absolute and complete muscular flaccidity, with abolition of all reflexes except those of respiration and circulation. There are surgeons who argue that the rapid induction and maintenance of such a complete narcosis is advantageous, in that it shortens the period of anesthesia and enables the operator to complete the operation more expeditiously, thereby, in two particulars, lessening shock. As to the effect of the anesthetic, authorities agree that the effect of ether and chloroform—depth of narcosis—depends upon their *concentration*, mixed with air, and *not* on the amount given. Other elements enter into the administration of nitrous oxide). As to the surgical procedure *per se* permit me to quote the words of Sir Berkeley Moynihan: "There are surgeons who operate on the 'canine' principle of savage attack, and the biting and tearing of tissues is terrible to witness. These are they who operate with one eye upon the clock, and who judge the beauty of any procedure by the fewness of minutes which it has taken to complete. There are other surgeons who believe in the 'light hand,' who use the utmost gentleness, and who deal lovingly with every tissue they touch. The scalpel is indeed an instrument of most precious use—in some hands a royal sceptre, in others a rude mattock." Operators are all too prone to abuse the license temporarily granted by complete anesthesia to traumatize tissues in a manner that would produce dire results both to the patient and the surgeon's reputation were the patient conscious.

I believe every surgeon can if he will train himself to handle tissues gently. Deftness and gentleness of touch may be a gift, but they can also be acquired and cultivated. And what sound reason can there be for rough and careless handling of tissues?

The value of local anesthesia—"nerve block"—as a factor in lessening shock is now fully established. It has a growing number

of advocates among surgeons and anesthetists have found it a great help in using nitrous oxide.

"Shock" is perhaps an overworked and much misused term. But in the sphere of operative surgery there is inevitably present that condition, symptom complex, clinical entity however indefinite, which is inimical to the patient's resistance and recovery, and which in many cases is the decideding factor between recovery and death. The anesthetic helps produce it; the operative procedure does its part; psychology contributes another factor. Hence is it not our bounden duty to the patient to exercise our full knowledge and skill at all times to combat this shock from every angle?

THE PRINCIPLES UNDERLYING THE CLAMP AND CAUTERY OPERATION FOR INTERNAL HEMORRHOIDS.*

By W. O. HERMANCE, M.D., Philadelphia.

The purpose of this paper is to outline in as brief a fashion possible, the author's ideas of the present status of this operation when performed in the manner hereinafter described, and to promote discussion of the same by those members of the American Proctologic Society, who may at times chose this form of surgery.

No attempt will be made to discuss the choice of the clamp and cautery over the other admitted methods of pile operation.

Enough to state that one chooses first a certain variety of technic to fit the class of case in which the operation is intended and secondly, with a view to safety, convenience, degree of familiarity one selects the method which appeals to his sense of ability of performance. Such ability must be best known to the individual operator.

Of the large variety of hemorrhoids described in literature, the purpose of this paper is to refer only to such as are seated above the mucocutaneous border and are of such consequence and variety that the trained proctologist considers necessary the performance of a radical operation.

This eliminates such varieties as external, constitutional and cutaneous piles. The very common condition of internal piles complicated by prolapse of more or less considerable degree is perhaps the ideal condition to which the subject matter of this paper applies.

The causes which give rise to necessity for an operation for hemorrhoids are bleeding or prolapse, or both, with the attendant pain, dragging, and discomfort. The end-results desired are a cure for the bleeding, removal of the relaxed hemorrhoidal prolapse and, of course, relief of the attendant symptoms. No two cases are exactly alike in pathology, therefore the first principle of this operation is obviously a complete arrangement of the surgeon's knowledge of his technic to the individual anatomy and pathology placed before him. This may only be determined by a careful history of the patient's trouble and a painstaking examination of local conditions.

Answers to the following questions enter into the consideration of the study of first principles. What shall be done for simple bleeding at stool—continued oozing after stool—bleeding following stool—prolapse at stool with spontaneous return—with digital return and prolapse from straining or lifting?

*Read at the nineteenth annual meeting of the American Proctologic Society, 1917.

The answers to these questions determine the amount of tissue to be removed, where and how to remove it. Too much mucosa and underlying tissue sacrificed with the subsequent scar and connective tissue formation is the cause of justified criticism of this form of pile operation and, what is more important, the cause of post-operative distress to the patient and to the surgeon. Too little tissue removed, means on the other hand a fugitive relief and probable necessity of a further operation and consequent dissatisfaction of both patient and operator.

The purpose of this operation for hemorrhoids is two-fold: first, to remove actual piles; second, to support relaxed pile bearing tissue and mucous membrane. Hence, it is evident why this paper, embracing these two correlated yet divergent factors, must here split and discuss such operations as may be attempted to cure piles without prolapse, piles prolapsing and bleeding, and simple prolapse without bleeding. Under the first division of this subject must be considered the simple object of removing pile bearing tissue only and the author is led to state that the underlying principle is to pick up, with hemostats, the pile pillars, apply clamps, and cauterize. Dealing with the second class, it is evidently necessary to proceed with a double object, to remove piles and to support the relaxed and protruding rectal mucosa by a series of splints. By splints, I mean a number of eschars produced by the cauterization, each replacing the pile column removed. Such artificially produced eschars act as splints as well as tucks in the redundant mucus membrane. In order to clear this point it is necessary to briefly describe the author's technic:

OPERATION.

Instruments.—Two dozen hemostats one clamp, the individual's choice, general surgical tools and the cautery, this uncertain instrument is the bane of every operator, the Pacquelin cautery, last in reliability, first in value when in good order, soldering irons with charcoal furnace or gasoline blower, both reliable but dangerous from the anesthetic standpoint. The electric cautery of many varieties, the best of which is an ordinary electric soldering iron, slow to heat but most reliable. All cauteries should be tried out in the hour preceding the operation.

Assistants.—Two if possible.

Operation.—Preliminary cleansing, I do not practice shaving the patient. Digital divulsion to the extent of the individual choice, at least enough to bring the operative area into view. Mapping out the area by hemostats; grasping the lower end of pile at the mucocutaneous junction, one hemostat to each pile pillar flat against the perineum and buttocks and held by the assistants, these points are three or four in number, according to the number of piles. The tumors are now brought into better view by placing relays of hemo-

stats, each successive instrument nipping the pile pillar at an angle of 45 degrees to its axis and each instrument about one-half to three-quarters of an inch apart, until a sufficient number of the clips are in place, all in line of the axis of the gut, in number two, three, or more. This important question is decided by the size of the hemorrhoidal tumor and the amount of tension of each preceding hemostat upon the fold or gut. At the site of the assistant's hemostat, if there is a covering of mucocutaneous tissue, a groove should be cut deep enough to allow these tissues to escape the clamp, this will obviate any pain following the operation and allow the operator to perform a true internal operation. The clamp is then placed in the exact line of axis of gut, heel grasping the highest point of tumor and, with jaws unclosed, pressed back against buttock or perineum; hemostats spread fan-shape and pulled outward. The clamp may now be closed by assistant and, from this moment, until stump is cauterized must not change hands. The clamp is now underlaid by several thicknesses of wet gauze to protect the skin from radiation burns. A vital point is here in evidence—the clamp performs a double object; to hold the pile and to crush: it is the author's earnest belief that it is advisable to cut little or none of the tissue enclosed in the jaws of the clamp, this mass is best cared for by combined crushing and cauterization. A cauterized stump is now produced by the means of a cherry red cautery, the stump to be cooked slowly, evenly, and carefully until black. Clamp is then released by a quick opening of the jaws to prevent injury of the stump which is allowed to recede. This performance is repeated upon each tumor leaving until last the anterior one. A ten grain iodoform suppository well oiled is introduced, external pads applied, and the operation is completed.

AFTER-TREATMENT.

Liquid diet for three days, attention to urinary bladder, blue mass on third night, saline or oil following morning, and oil enema upon inclination for stool. The enema should not be left to untrained hands.

SUMMARY.

By following this technic, postoperative pain is nil. Primary hemorrhage, if cauterization is complete, is exceedingly rare. Secondary hemorrhage may occur in any form of pile operation. The author has had two cases in ten years. Liability of recurrence nil, author knows of no return in over twenty years in Adler's service. Average confinement to bed, one week. Average detention from duties, two weeks. The best founded criticism is stricture following. This objection can be entirely overcome by attention to the following factors which are all important: First, no more tissue

grasped, clamped, and cauterized than absolutely necessary to accomplish the two ends desired, to-wit, cure of bleeding and cure of prolapse. Second, in grooving the lower end of the hemorrhoidal tumor, care must be taken to leave islands of untouched skin and mucocutaneous tissue, this prevents the circular or low variety of postoperative stricture. Third, if necessary, a gloved finger passed through the space occupied by the splinted cauterization at frequent intervals, after the secondary hemorrhage danger zone has been passed. With attention to the islands of cutaneous tissue and careful observance of economy in the removal of non-pile-bearing gut, the gloved finger will not always be necessary, the exercise of the sphincter in daily evacuations will sufficiently dilate the narrowed orifice.

With perhaps some minor debatable differences of opinion, the author is indebted for many of his ideas upon the subject to a constant surgical association for many years with his colleague and chief, Dr. Lewis H. Adler, Jr.

PSEUDOMYELOMA OF THE VERTEBRAL COLUMN.*

By H. W. MILLS, M.R.C.S. (Eng.), L.R.C.P. (London), San Bernardino, Cal.

First I will make some preliminary remarks on the subject of myelomata in general, then briefly discuss my own case, and finally show you some lantern slides illustrating the gross pathology of the latter, and the histology of this and of other cases appearing in the literature of the subject.

Myeloma—the condition is so rare that no man can quote *largely* from his own personal experience. The following facts are culled from the writings of Christian, Stumm, Hahn, Wright, Klein, in this country, Shennan of Edinburgh, and H. v. Bomhard of Munich, who have all written on this subject in the last few years.

According to Shennan, multiple myeloma may be defined provisionally as "A primary new formation developing simultaneously in many of the cancellous bones, especially in those of the trunk and skull, less frequently affecting the long bones; chiefly attacking males above the age of forty years: in many cases forming masses which may be palpable during life: composed of more or less rounded, nucleated cells, which correspond to one type or other of the marrow-cells or their precursors: resulting locally in extensive absorption of bone: *forming no true metastases*: associated with severe neuralgia pains, intermittent high temperature, and the presence of Bence-Jones albumose in the urine."

The literature of the subject practically begins with Henry Bence-Jones' communication "Some account of a new mineral substance occurring in the urine of a patient labouring under Mollities Ossium." (Edin. Med. Jour., 1850.)

It was not till 1873 that the disease was distinguished clearly from other diseases of bone, by J. v. Rustizky, who realized that the new formation consisted of cells analogous to those of active bone marrow, and gave it the name of "Multiple Myeloma." He regarded it as a local hyperplasia of the marrow, of benign nature, distinguishing it from Virchow's myelogenous sarcoma.

Kabler in 1884 was the first to state the constant relationship of the albumosuria to multiple myeloma, and in consequence the disease is often termed "Kabler's disease."

Clinical Characters.—About 75 percent of the reported cases have occurred in males, in the 5th and 6th decades of life (variation from 36 to 70). The duration of the disease varies from four months to

*Read before the Southern California Medical Society at Redlands, Calif., May 3, 1917.

eight years (one case, Kabler) : average duration—about 2 years. There is frequently a history of the disease being first noticed after a severe mechanical injury or muscular strain. First symptoms noticed are usually severe stabbing pains referred to some part of the thoracic wall, vertebrae, pelvis, or to the extremities or head. Pains are increased on pressure or muscular exertion and may disappear, only to return. In many cases, soft prominences, occasionally pulsating, appear on ribs, sternum, clavicles, or cranial bones. Fractures are not uncommon. Kyphosis is a common feature in well marked cases, and dorsal spinous processes may disappear, being replaced by soft tissue. Paralyzes may develop as result of pressure on nerves or spinal cord, with loss of control of the sphincters: temperature may be high, with intermissions: emaciation, diarrhea, coughing with expectoration may occur. Fatal issue is due to exhaustion, often accelerated by septic broncho-pneumonia.

Nothing is known of the etiology of the disease.

Albumosuria is almost constantly present in these cases: *Its presence is always of fatal import.* The peculiar protein is also present in blood, in feces, and in the affected bones (Weber). Albuminuria may be present as well.

Williams and Evans (1910) believe that the protein is probably a derivative of the chondro-mucin of bones and tendons.

Examination of Blood.—As a general rule marked blood changes tend rather to discredit a diagnosis of multiple myeloma.

DIFFERENTIAL DIAGNOSIS.

Osteomalacia.—Commonly attacks pregnant or puerperal women.

Myeloid Sarcoma.—Seldom if ever attacks ribs and vertebrae. Usually located in ends of long bones. Other central sarcomata, and periosteal sarcomata, are differentiated by the age at which they occur, the character of cells composing them, and by the occurrence of secondary metastases in the internal organs.

Leucocythemia.—The proliferation in the marrow is not confined to one variety of cells, as in myeloma.

In pseudo-leukemias (e. g., Hodgkin's disease) spleen, lymphatic glands, etc., show special alterations not present in myeloma,

The Roentgen rays are useful in establishing the differential diagnosis.

Morbid Anatomy.—The affected bones may show no visible pathological alteration, or may present soft rounded projections or localized swellings: or may be practically completely disorganized, and replaced by soft, in some cases almost fluid, new tissue. They may be cut with a knife, are less resistant to pressure than normal bones, and are more easily broken.

On section, the marrow and spongy bone are replaced by grayish-white, grayish-yellow, reddish-gray, dark-red, or brown sarcoma-

tous looking tissue, commonly homogenous or gelatinous in appearance. Central necrosis may occur.

The bony trabeculae are completely absorbed within the mass; growth invades the periosteum, and *may spread by direct continuity to adjacent soft tissues*, displacing these, and forming rounded prominences. In no case have prominences been covered by thin egg-shell-like layer of bone as in myeloid sarcoma. The term "*Myelomatosis*" has been applied to the diffuse new formations.

Cranial bones may show numerous small nodules, starting in the diploë: the sternum is frequently affected, and also the ribs. In the case of the vertebral column, any part—or the whole—of the spongiosa of individual bones may be replaced. Masses may project on the surface, anteriorly, laterally, posteriorly—in the last situation they may compress spinal cord. The long bones are not often affected.

The disease is confined to the osseous system, and may affect the greater part of it. Apparent metastasis may admit another explanation. We are not yet in a position either to affirm or deny that in rare cases myeloma may form true metastases in the soft tissue.

Three cases are here described.

It is essential to start out from the generally accepted dictum that a true myeloma must be a homologous new formation (quâ the bone marrow), i. e., it originates from marrow parenchyma. It cannot be regarded altogether as a hyperplasia of the marrow, seeing that as a rule only one type of cell is affected, to the exclusion of other types of cells normally found in active, or reacting, bone marrow. Giant cells with convoluted nuclei (myeloplaxes) are not common: similarly fully matured cells—the polymorphonuclear series—are wanting, excepting occasional eosinophiles, so that a further distinction emerges, viz.: that the *constituent cells are mainly or wholly unripe cells*. The above definition excludes such cells as osteoclasts, osteoblasts, and others constituting or formed from the so-called endosteum.

Etiology.—The arguments which have been advanced by different authors with regard to the etiology of multiple myeloma tend to support the concept of a system disease rather than of a tumor growth. A history of syphilis, chronic alcoholism, over-strain, malnutrition, etc., is common. A congenital weakness or insufficiency of the hemato-poietic apparatus may be the fundamental cause.

CONCLUSIONS.

1. Multiple myeloma appears to be a system disease of the hemato-poietic apparatus, of *malignant nature*; blastomatoid rather than true blastoma.

2. It is questionable whether all different varieties of myeloma

described can be clearly differentiated from each other. Possibly the apparent differences are due to the variability of one cell type.

3. The apparent metastases do not result from embolism of cells of the new formation in the marrow, but are due to simultaneous transformation of foci of hemato-poietic tissue present in the organs, or to direct local extension.

4. Nothing definite or trustworthy is known with regard to the etiology of the disease.

5. The name "myeloma" should be restricted to the disease described by Rustizky, and should *not* be employed to designate all new formations in the interior of bone, including the myeloid or giant celled sarcoma, and other central sarcomata of bone, the cells of which are not derived from bone marrow parenchyma. Or the term myeloma should be given up completely, seeing that the termination "oma" suggests to many tumor formation, and the term "Myelomatosis" should be adopted in place of it, seeing that this term connotes a definite pathological alteration, *sui generis*, of bone marrow proper.

Christian says, "A histological study of 11 cases of myeloma shows a striking similarity of cell structure with differences of minor degree. The common characteristics of the cells are a finely granular, slightly basophilic cytoplasm, an eccentrically placed nucleus, a nucleolus, centrosomes, a nuclear membrane, and a tendency to mural arrangement of the chromatin. Central nuclear changes, regarded as the result of degeneration, are commonly found. Mitotic figures occur in most of the cases studied by me, though absent in a few.

Myelomata are to be classed with the tumors. They tend to remain localized in the bone marrow, but almost all show evidence of invasive growth into adjacent structures, and in a few metastases have taken place. These tumors are 'malignant' in the usual sense of the word, but their malignant properties are apt to appear *late* in many cases.

With these characteristics there is a greater resemblance of the tumor cells to bone-marrow plasma cells than to myelocytes. In most of the cases reported by other observers the cells show these characteristics, and these tumors form a group within which the cells of individual cases show no greater variation than occurs in other tumor groups." Stumm says the term "Multiple Myeloma" refers to a new growth occurring in the bone marrow, especially in the sternum, ribs, vertebrae, and less frequently, in the skull and some other bones. It is characterized by cells that are very similar to certain normal cells in the bone marrow, and the gradual gradation of tumor cells into the normal cells: by the fact that metastasis is not present, at least not as in ordinary malignant tumors, if at all, though it may involve the soft parts by continuity of

growth: and lastly by the fact that the growths are multiple, as the term implies, and probably occur as such from the very beginning. Morris H. Kahn, of New York, reported 4 cases in May, 1914, and states that he had found 15 more in recent literature (Germany 8, America 5, England 1, France 1). In 1907 Permin recorded 40 cases, and in 1908 Decastello 2 more: this makes 61 cases in all. In Austin's case complete disappearance of the bony substance of the 12th dorsal vertebra occurred. Of recent cases only 1 was in a woman (Hahn). The disease is progressive, lasting from one month to one and one-half years, and is always fatal. *Some authentic cases never had Bence-Jones protein*, including 2 of his own, and in 1 other they were absent for long periods: Bence-Jones protein has also been found in lymphatic leukemia.

Klein of Bayonne states that most cases of myeloma have an accompanying nephritis, showing a small amount of serum albumin as well as the Bence-Jones protein. Care must therefore be taken in not prescribing the precipitate to albumen—a flocculent precipitate occurs *before* the boiling point: cloud appears at 50° C, increasing up to 85° C, disappearing almost entirely at 100° C, and reappearing at 70° C.

CASE REPORT.

My own case was that of a big, powerful man, age 59, weight 235 lbs., an old soldier and a saloon keeper by trade, who was, when apparently in perfect health, run into from behind by a small boy on a bicycle on April 4, 1914. He fell forward on his hands and knees, but immediately got up and went about his business, regarding the accident as trivial. There were no symptoms of any kind for three weeks, then, on April 23, 1914, he began to have epigastric pains, which he attributed to indigestion, and a few days later what he thought was intercostal neuralgia. He then went to a doctor who told him he had rheumatism, and sent him to Murietta Hot Springs. The hot springs did not cure his rheumatism, on the contrary he rapidly developed incoordination of his lower limbs, falling several times in the bath house, partial paralysis of the rectum and bladder, and his girdle pains increased in severity; as he was obviously rapidly getting worse he was brought into hospital on May 1, 1914, when his condition was found to be as follows:

Family history unimportant.

Previous History.—Influenza in 1889. Steady moderate drinker all his life. No history of syphilis. Was in perfect health at the time of his accident.

Present Condition.—Spastic paraplegia with painful spastic contractions of the muscles of his lower extremities. Loss of epicritical sensibility, from the level of the 7th dorsal vertebra downwards, and of protopathic touch from 3 inches further down. Partial paralysis of rectum, with marked abdominal distention. Paralysis of bladder with severe cystitis (as the result of catheterization). Exceedingly severe girdle pains. Double ankle clonus, increased knee jerks, and double Babinski.

Treatment.—A supra-pubic cystotomy was at once done and a retention catheter inserted. He was put on mercury and massive doses of potassium iodide. A Wassermann test was made by Dr. Brem which proved negative. Attempts were made to obtain an x-ray photograph—owing to the fact, however, that he was an exceedingly heavily built man, they were not, at this time, successful.

Notwithstanding the fact that his symptoms in no wise improved under specific treatment—on the contrary they rapidly became worse, to such an extent that he had to be kept almost constantly under the influence of morphine—he refused, in the light of the negative x-ray results, to submit to a decompression laminectomy at this time. On August 24, 1914, however, a satisfactory picture was obtained by Dr. G. R. Owen, demonstrating clearly a jack-knife fracture of the body of the 7th dorsal vertebra, with some involvement of the

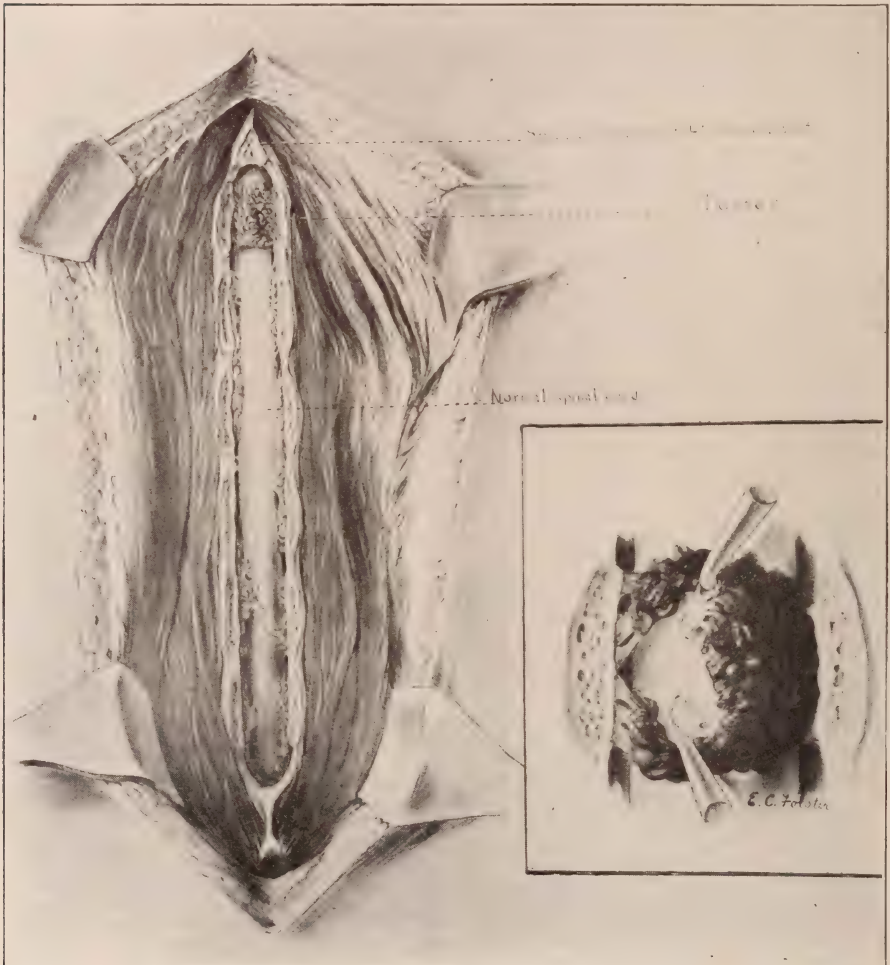


Fig. 1.—Pseudomyeloma of the vertebral column. Inset shows an enlarged view of the tumor.

contiguous parts of the 6th and 8th, and projection of the spine of the 7th backwards from the line of those above and below. The patient now accepted operation and on August 31, 1914, I did a decompression laminectomy, the cord immediately bulging markedly. From this time his symptoms rapidly improved: the retention catheter was removed two weeks later, and the fistula healed immediately. He left hospital on October 25th, 1914, wearing a plaster of Paris corset. His spastic pains rapidly disappeared and he regained his power of locomotion. In March, 1915, 6 months after his operation, he discarded his corset, and resumed his usual occupation.

From this time until January, 1916, he was practically well, though as a matter of precaution he still walked with a cane. On Jan. 15, 1916, after exposure to cold and wet, a sudden recurrence of his symptoms of spinal pressure took place, and rapidly got worse. On February 15, 1916, he came to my office, at which time marked incoordination with increased knee jerks obtained, but no clonus or Babinski. I diagnosed spinal pressure from scar tissue, and advised operation. On Feb. 17, 1916, he was seen in consultation by Dr. W. E. Jones, who confirmed my diagnosis and advised a second laminectomy. On Feb. 25, 1916, I accordingly re-exposed the area of the first

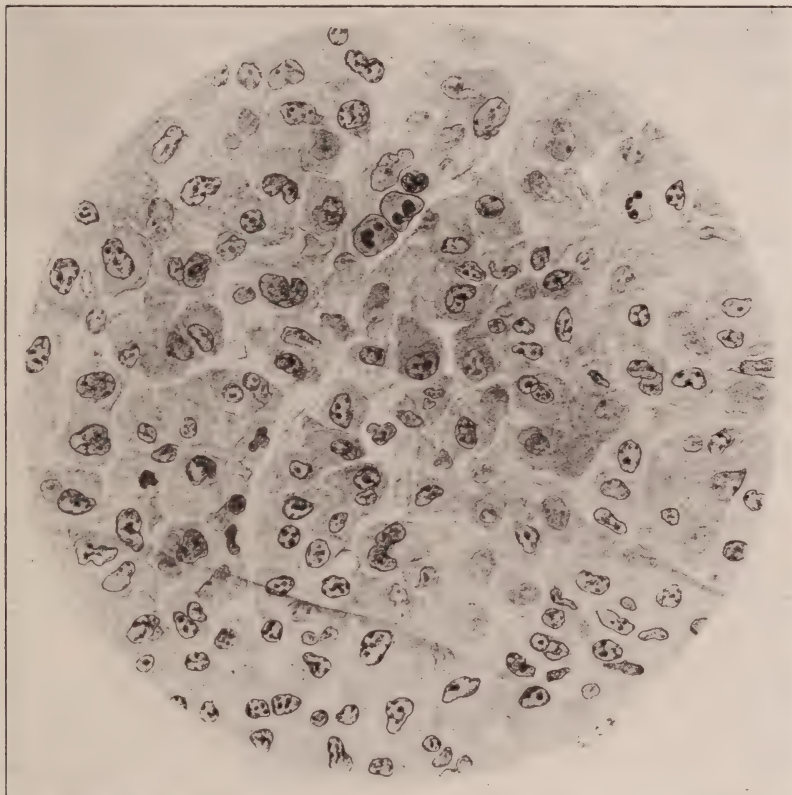


Fig. 2.—Drawing from microscopical section.

laminectomy, but found no pressure whatever on the cord, which appeared to be absolutely normal. Not being satisfied, however, with this negative result in the face of the symptoms which obtained, I continued the laminectomy upwards and, after passing one inch of healthy cord, came upon a large purplish granuloma covering the anterior aspect of the cord and, apparently, springing not only from the bony walls of the canal but from the coverings of the cord itself: as its complete removal was technically impossible, I had to content myself with free decompression and removing a portion for microscopic examination. The specimen was sent to Dr. W. V. Brem of Los Angeles, who reported it to be a myeloma—an opinion confirmed by Dr. W. Ellis Jones of Los Angeles.

DR. H. W. MILLS,
San Bernardino, Cal.

LOS ANGELES, March 8, 1916.

The paraffin sections of the "granuloma" of the cord show the tumor to be a myeloma. At least that is what we think it is. It is certainly a malignant growth, and has to our mind the typical appearance of a myeloma. We would like for you to send us down some urine for us to test for the Bence-Jones bodies.

LOS ANGELES, March 21, 1916.

I have just been looking over again the section, and it seems to me almost certainly a myeloma rather than a sarcoma. I am glad you are going to make the tests daily, for, as you say, the Bence-Jones body sometimes appears intermittently.

WALTER V. BREM.

DR. H. W. MILLS,
San Bernardino, Cal.

LOS ANGELES, March 8, 1916.

I have examined your specimen from your laminectomy with Dr. Hill, and there is no question in our minds but that you have been dealing with a myeloma. The sections are absolutely typical. It is certainly a highly interesting case.

No doubt your patient had the myeloma for some time previous to his injury, and the bone erosion incident to the myeloma was undoubtedly a contributory factor to the fracture. The injury, as I recall it, was not of an extreme type. The violence was not extreme, and yet a definite fracture occurred due to the structural bone change incident to the neoplasm. It will be interesting to know if the patient shows albumose in the urine. It is usual to find Bence-Jones bodies.

I regret that the prognosis is, of course, a miserable one. If I were you, I would certainly add this case to the literature and make every possible attempt later when the unavoidable occurs to get a gross section at autopsy. A review of this case should make interesting and instructive reading.

ELLIS JONES.

A daily search for several months for Bence-Jones bodies proved negative.

The patient made a straight, complete, uninterrupted recovery and went home March 30, 1916.

Now, you may ask me why, in the face of the apparently plain diagnosis of Myeloma, both from the gross and microscopic pathological appearances, I have labeled this case "pseudo-myeloma"? The answer is this, the patient is now, May 3, 1917, perfectly well and working at his usual occupation, he has not got even a trace of spasticity left. It is now three years since his accident, and looking to the trivial nature of the latter we would have to assume that the pathological changes in his vertebrae had existed for some time before that, but the average duration of the life in the cases of myeloma recorded is less than two years: hence I hedge, and call his tumor a "pseudo-myeloma," remembering the old Biblical advice, "Teach thyself to say I cannot tell."

April 24, 1918. I have today examined the patient, who is quite well and free from any trace of spasticity in his legs, while walking; he is, in fact, actively engaged in prospecting in the mountains.

The tumor was not malignant.

INTESTINAL STASIS AND AUTOINTOXICATION.*

By FRANCIS ROE BENHAM, M.D., Syracuse, N. Y.

Sir Arbuthnot Lane has been a pioneer worker in this line of medical and surgical research. Not only is he noted for his work in intestinal stasis and autointoxication, but also has the distinction of being the first to introduce saline solution direct into the circulation. He was the first to operate for cleft palate in infants one week old; his bone plating operations are known the world over.

It was my honor and pleasure to have visited his clinic in Guy's Hospital, London, and to study with great profit his operations and teachings.

He believes that most of the ills and diseases that the flesh is heir to are of autotoxic origin. Bright's disease, diseases of the blood, the anemias, rheumatic conditions, diseases of the heart, liver, pancreas, in fact, he says if it were not for intestinal stasis and autointoxication there would be no need for physicians and surgeons.

Some of the greatest surgeons of the world were present at this clinic, including Ven Eiselberg of Vienna, Moynihan of Leeds, Murphy of Chicago, C. H. Mayo of Rochester, and many others.

Intestinal stasis means a slowing of the intestinal current. There are many degrees of stasis in different individual cases. The degree or the amount of slowing of intestinal current determines the amount of absorption of toxins into the blood. The longer waste material remains in the intestine where absorption takes place, the more toxins are taken up, hence, the more pronounced and severe are the symptoms.

We all are familiar with the typical case suffering from this condition, although we do not all agree with the radical opinions of this great surgeon; nevertheless, we all agree that as a result of autointoxication the initial irritant which circulating in the blood to the different organs produces pathological changes. Why is it not reasonable to assume that these toxins might irritate or congest organs and tissues just as much as alcohol and numerous drug poisons. If this be true and I believe it is, we have a very valuable asset in regard to preventive disease and prophylaxis.

In order that a more concise opinion may be expressed let us very briefly consider the gross anatomy of the alimentary tract. The anatomy may be considered as a long tube varying from eighteen

*Read before the Autoxic Club, March 15, 1916.

to twenty-eight feet in length with numerous dilatations and contractions, and having in certain positions valves or sphincters to hold the contents for digestion and absorption to prevent regurgitation.

Food when swallowed enters the first large dilatation commonly called the stomach. This is the largest dilatation of this tube. Food having once entered the stomach is prevented from regurgitation by the first valve located at the cardia. Passing through the stomach into the duodenum another valve is encountered called the pyloric valve, passing on still farther through the duodenum, jejunum, and ileum, where we meet another valve called the ileocecal valve and on still farther until we reach the end of the tube at the anus. If for any reason the working of these valves is interfered with we begin to get abnormal conditions which cause slowing of the intestinal current and stasis. Each of these valves might be discussed at great length, as much has been already written, we will, however, confine what few things we have to say to the ileocecal valve.

This valve, as you all know, is located at the point where the ileum or small intestine joins the cecum and large intestine. Most of the absorption that takes place in the small intestines takes place in the lower eighteen inches of the ileum. This fact has been proved experimentally. It has also been proven that if fifteen inches of the lower ileum is resected the patient will die of starvation. It has also been proven that the colon is capable of absorption of nothing but saline solution. This is, indeed, very fortunate when we consider that the contents of the colon is by weight one-half bacteria.

The function of the ileocecal valve is two-fold. First to prevent the passage of the intestinal contents before proper absorption has taken place. Second to prevent regurgitation of the colon contents into the ileum. If any part of the intestine is suffering from irritation the valve or sphincter above will contract; this is to prevent the passing backward of the intestinal contents. There has been described an insufficiency of the ileocecal valve. Nutrient enemata have been forced through the sphincter. If for any reason the functions of this sphincter are interfered with and a reverse peristalsis of the colon is produced, the contents of the colon forced through the ileocecal valve into the lower part of the ileum, the place where absorption takes place and the contents of the colon is one-half by weight bacteria, how profound and serious must be the symptoms of autointoxication thus produced.

Short's book, entitled, "The Newer Physiology in Surgical and General Practice," says that investigation has proven definitely that saline is the only thing absorbed in the colon, aside from a very small amount of aminocid.

The case cited is as follows: Two cases feed per rectum, one with nutrient enemas, so-called, the other by saline solution only, over a period of ten or twelve days, the nitrogenous output from the kidneys of both cases was the same, thus proving that only saline solution was absorbed, the rest of the nutrient enema was recovered in the stools. What a misnomer is "nutrient enemata."

Any irritation of the appendix, be it ever so slight, causes a contraction of the ileocecal valve, hence, the retarding of the ileal contents, in many cases so long that pathological conditions arise in the ileum and these changes cause contraction of the pylorus and thus produce distressing gastric symptoms.

Ulcers and hemorrhoids may produce a contraction of the ileocecal valve and thus cause intestinal stasis and autointoxication.

The worse cases of autointoxication, it seems to me, caused not only by an insufficiency but also by external membranes, which interfere with the proper working of the ileocecal valve. Thus, patients are absorbing toxins into their blood which should be eliminated through the anus. No wonder they are thin, emaciated, depressed, suffering with periodic headache and indigestion. No wonder there is an offensive odor to their perspiration, their tongue coated and breath foul, they are pessimists. How could they be otherwise? They are saturated with a poison produced in their own systems, and at a place where the body derives nutrition which is carried to all parts of the body.

The lower ileum, the cecum and the ascending colon, irritated by the absorbed poison, begin to build fortifications in the shape of membranes whose function shall be to assist in the way of support to the poisoned intestines. These membranes are of various sizes and shapes and located over the terminal ileum and cecum.

Lane's name has been given to one membrane and the kink thus produced is called Lane's kink. The membranes covering the cecum and ascending colon are called the Jackson membranes. It is said by some that enteroptosis is the end result of long continued auto-intoxication, that the supports of the abdominal contents are weakened and allow the intestines to drop in the line of least resistance, just as you get wrist drop when poisoned with lead.

With intestinal stasis continued over many years the contents and weight of the intestines are greatly increased. There is generally obstinate constipation, although you may have autointoxication and diarrhea. As a result of this increased weight there is produced a dragging on the mesentery which, little by little, yields to the stress, until an enteroptosis is produced. Having a full-fledged case of enteroptosis, intestinal stasis and autointoxication are inevitable. It is these cases that Lane treats by colectomy complete down to eight inches of the rectum.

Moynihan removes the cecum and ascending colon and half the

transverse colon, anastomosing the ileum with the sigmoid. Many and varied are the operations for this condition, space forbidding further mention. In the realm of medicinal treatment mineral paraffin oil, also advocated by Lane, seems to have had the preference by many. I will not go into the treatment of this condition, except to say that my clinical experience with small doses of calomel followed by saline at regular interval has proven of inestimable value to my patients.

The surgical treatment of these cases is not a settled treatment, opinions are many and as varied. Of one thing we are certain; that is, that in all the arguments for and against intestinal stasis and autointoxication somewhere from the darkness of unproven conditions exists a condition which when proven shall be of inestimable value to the human race.

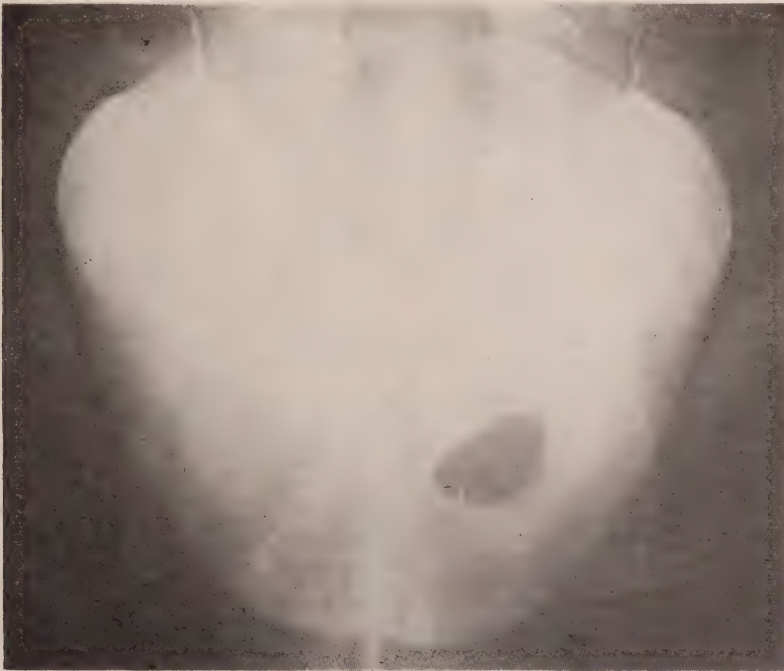
AN UNUSUAL CASE OF VESICAL CALCULUS.

By PHILIP H. COOK, M.D., Worcester, Mass.

Roentgenologist Worcester City and Memorial Hospitals.

The present case is reported as an interesting commentary on modern methods of exact diagnosis. In addition, it emphasizes the pitfalls awaiting the roentgenologist who approaches his case with other than an open mind.

A business man of about 30 had never had any serious illness. Three years ago a right-sided inguinal hernia was successfully operated. Eighteen months ago he began to have dysuria, and passed some blood. Being at the time in a large medical center,



Roentgenogram showing stone to right of median line. Reversed in printing.

he consulted a celebrated genitourinary specialist, who made a cystoscopic examination and expressed the opinion that a new growth was present. The symptoms, however, yielded to local treatment, and the patient allowed the matter to rest until something more than a year later, when the trouble returned more severely. Being at this time in another large city, he consulted another specialist, also a man justly celebrated in his line. The opinion this

time was that no growth existed, but that a diverticulum was present, containing a stone. A little later the patient returned to his home town, and came to me for examination "to see which man was right." A series of plates showed an oval calculus about the size of a robin's egg, well to the right of the median line and evidently fixed in position. As this accorded so well with the opinion of the second cystoscopist, the opinion was passed that the latter's diagnosis was correct, and the patient decided to return to him for operation. A cystoscopy one week later disclosed the stone exactly as shown, but no diverticulum was found. *The stone was hanging from the bladder wall by one of the silk sutures of the hernia operation.* Removal was followed by uneventful recovery.

THE CANCER QUESTION.

BY ALBERT C. GEYSER, M.D., New York.

The late Professor Doyen of Paris devoted no less than sixty-seven pages to the treatment of malignant growths by physical therapy in his 1917 book on surgery.

In this country the Percy method of coagulation with a Wappler high-frequency apparatus is rapidly coming to the front. If it has nothing else to recommend it over the ordinary system of surgery, it is certainly bloodless. After all, this may prove to be a decided step in the right direction.

TUMOR CHEMISTRY.

From time to time attempts have been made to discover possible chemical differences between the cells of tumors and those of corresponding normal tissues. A review of the literature on the subject leaves the impression that if any differences exist they are not sufficiently marked to deserve emphasis. Not long ago, however, analyses of malignant tumor tissue by Kocher indicated that this yields a larger proportion of the familiar diamino-acid derivatives of the proteins than is found in normal tissues. Taken in connection with the demonstrated role of some of the diamino-acids, notably lusin, in growth, these facts seemed to offer a new approach to the cancer problem. The high content of the diamino-acids in the tumors might be looked on as in some way responsible for the abnormal rate of growth of these tissues. Drummond of the Cancer Hospital Research Institute, London, has made new analyses of neoplasms which could be controlled experimentally. These furnish a different interpretation to the findings just mentioned. The distribution of nitrogen in a large number of the proteins of human and chicken tumors and normal tissues has been examined. A higher proportion of the diamino-acids generally exists in the case of the tumor proteins. It has been shown that in all probability the diamino-acid content of a tissue varies directly with the amount of nuclear material present. The more rapidly growing and cellular tumors, therefore, show a higher percentage of these substances than do the slowly growing ones. As Drummond contends, all the evidence points to the conclusion that the higher percentage of diamino-acids which is often present in the proteins of malignant growths is due to the greater proportion of nuclear material which they contain; for similarly high figures for this fraction of the protein molecule are found in the analysis of those normal tissues

which possess cells rich in nucleoprotein, as, for example, normal human pancreas and spleen.

PHYSICOTHERAPY.

It is very gratifying to see that physical therapy is at last invading the realm of cancer therapy. The statistics of real and complete recoveries after radical removal have not been very encouraging. Noting this fact, the surgeons plead for early surgical interference as the only means of securing better statistics. Such a plea is not without logic or reason. Of late the profession have advanced the theory that even the removal of a small section, for microscopic examination, is fraught with serious consequences. The fact of the matter is that a cancerous area, or an area suspected of being cancerous, should not be cut into until all other therapeutic measures have failed to remove it. If, on examination of the removed section, the tumor turns out to be of a benign character, neither good nor harm has been done to the patient. If the biopsy indicates malignancy, then irreparable damage may have been inflicted upon the patient.

From the surgeon's point of view, immediate and complete operation is the only course to be followed in such an event. Even these early operations, before there was any clinical history of malignancy, have not materially changed the mortality statistics. On the other hand, it is an undeniable fact that many patients with all of the evidences of clinical malignancy, corroborated by laboratory findings, live on indefinitely when not subjected to surgical interference. The fact is that a given patient frequently lives longer without than with an operation.

Some explanation must be found for this condition. It has been assumed that when a cancerous area is cut into, new or previously unused avenues for the spread of the cancer cells are opened.

Upon serious reflection, does such an explanation seem really logical?

Let us take a hypothetical case. A female patient presents all the clinical manifestations of cancer of the breast. A biopsy is made and the laboratory confirms the clinical diagnosis. The surgeon undertakes a radical operation, all skin, muscle, glands, fascia, etc., are removed, the bloodvessels are tied off, the wound left to heal. Where, when and how did any of the cancer cells migrate through the newly opened channels? Before the first incision was made there was no recognizable migration, certainly after severance of the parts there could be none. Yet metastasis did occur in this case shortly after complete and radical removal. The incisions have all been made, as far as the surgeon knows, through sound and uninvaded tissue. Sometimes recurrency appears in the scar, sometimes in distant tissue and organs. Where does it come from?

There is one thing that it does not come from, that is, from the mass or tissue that has been removed.

At this time we are warranted in considering the following questions, is cancer a local or a constitutional disease? Is it ever a purely local or is it always a constitutional disease? Is it local at first and does it become constitutional later?

From the mass of evidence before us we are in a position to say that cancer may be and sometimes remains a local disease. Cancer may be, in some cases, a constitutional dyscrasia with, later on, localized manifestations. Cancer may be local at first and become constitutional later. In other words, we have all these various phases of cancer in patients and no one can tell, with our present knowledge, which is which in any particular case.

Let us continue with our hypothetical case. It is a well-known law in Nature that *everything that lives must at some time or other die*, and that everything creates the means for its own destruction. Cancer is no exception to this universal law. Every cancer destroys itself. Of course, the unfortunate host may lose his life long before the cancer succeeds in its own destruction. It has been assumed that the cancerous growth manufactures a certain poison (cancer juice) which finally causes cachexia and the death of the patient.

A healthy human being is endowed with certain powers which furnish antitoxins. As long as these antitoxins are furnished in an adequate amount, so long will there be no serious consequences from the toxins. As soon as the antitoxins are inadequate in amount toxemia results, because there is nothing to counteract the poison. One seems to be directly and proportionately dependent upon the other if harmony is to be maintained.

Let us suppose now that in our original patient the cancer of the breast was at one time a local disease, the result of trauma, continuous irritation or any other adequate cause. Sooner or later the antiphysiologic activities of the cancer cells poured out this "cancer juice," there and then the system as a whole became involved, because, from now on, the all important antitoxin had to be furnished. For some time the cancer juice and the antitoxin production was balanced. The tumor might grow to any size, yet the patient did not suffer clinically from cancer. At this time the radical removal of the cancer mass took place. The general system was neither forewarned nor forearmed of this sudden removal. What became of all the antitoxin present in the body? What became of their cells and their functional activities which suddenly find themselves without an occupation?

If we recall the side chain theory of Ehrlich, what is to hinder the system exactly in the same manner that it caused cells to react to cancer poison, now to cause a reaction to the antitoxin product. It would have to form new cancer cells somewhere, or, rather, cancer

juice producing cells, anywhere to again pour out cancer juice to balance the presence of the antitoxin which is present now without a function and must be, as all else is, destroyed by a counter force, if equilibrium is to be maintained.

It may be argued that antitoxins have repeatedly been injected for prophylactic purposes and never found to be harmful to the recipient. That may be true, but in this instance the antitoxin is not injected in one or a few doses, the cells of the entire system have taken upon themselves the new function of producing their own antitoxin. It is probable that we are dealing with some interference of cell function, some internal secretion.

Sudden removal, therefore, by the knife, cautery, or Percy method of coagulation, are of questionable value. There are two periods in the cancer history when such radical procedures may be productive of some good. Either at the time when the cancer is as yet local or when the mass is so large that the system cannot adequately supply the antitoxins required. In the former it might be curative, in the latter palliative, expedient and cosmetic. In the former there is no reason why a complete, and permanent cure cannot be attained; in the latter the patient's life may be prolonged and made more comfortable; recovery or cure is not to be looked for.

It may be contended that if the above hypothesis is correct, then the gradual or piecemeal removal would be indicated. Since, however, irritation of some kind was most likely the original cause of the cancer, it would only be made worse.

If surgery is admittedly not a cure for cancer, is there anything that holds out hope to the patient?

Serums, anticancer injections, Coley's fluid, and the use of the internal gland secretions have all been tried and found wanting. Yet each one of these seems to have some cures (?) to its credit. So, again, there must be some reason for these apparent cures. If we examine the records and the claims of their advocates we find that their patients recovered in exact ratio as they reacted to these various treatments. The reaction in each case is measured by the amount of fever or temperature the patient developed after such treatment. It is a well-known fact that when a cancer patient is the subject of some intercurrent disease which causes him to have a rather high temperature for a long continued time, the cancer frequently disappears without treatment.

A number of competent observers and laboratory workers have demonstrated that cancer cells may be killed when exposed to certain temperatures which are entirely harmless to normal cells.

DIATHERMIA.

Diathermia is a means by which any part of the body may be subjected to a raised temperature. When such a raised temperature

is passed daily, for one or more hours through a malignant growth, such a growth is compelled to change its unphysiologic production of the "cancer juice." The cancer cells die off *gradually* and are *absorbed*. *The necessity for the production of the antitoxin is gradually and physiologically removed.* Sometimes the entire mass disappears, sometimes the mass grows smaller and becomes softer. The tumor per se never killed a patient, it was the "cancer juice" that did the damage. Since then the physiology of the mass has been changed by the application of the diathermia, there is no longer present the production of the "cancer juice," hence what was originally a malignant tumor has been changed into a benign growth. If then the diathermia has failed to completely absorb such a growth, it may now safely be removed by any of the surgical methods without danger of metastasis or recurrence. It is now a local affair and may for cosmetic reasons be dealt with accordingly.

Each of the following cases will demonstrate some particular phase of the subject:

CASE I.

Mrs. L., American, age 49 years, referred by Dr. Levy. Mother of patient died of cancer. A tumor appeared in right breast which grew rapidly, when examined measured $2\frac{1}{2} \times 3\frac{1}{2}$ inches, freely movable on chest wall, adherent to skin, nipple retracted. At the Norwegian Hospital it was pronounced cancer and arrangements made for immediate operation. Patient decided to try diathermia. The treatment was continued from February, 1915, to July, 1915, when all trace of the mass had disappeared. Patient is alive and well. The next case may help to form some conclusion on this case.

CASE II.

Mrs. C., American, age 52 years. Sister of patient in case 5. Seven years ago tumor of left breast was removed which proved to be cancerous. Three years ago a similar tumor appeared in right breast; at the time of examination it measured about 2×2 inches, movable in chest but firmly connected to skin and retracted nipples. The tumor was placed between the two electrodes so that only the mass itself was heated. This can be done when the breasts are large enough and the tumor free from the chest wall. 500 milliamperes were passed for 40 minutes on alternate days. After six months no trace could be found of the tumor. Was this or the preceding case cancerous? Both patients are alive and well.

CASE III.

Mrs. F., American, age 58 years. Six children, youngest 22 years. Menstruation ceased at 53 years. One year ago noticed a brownish-red discharge, offensive odor; bearing down pains which at first were intermittent, but of late had become almost constant, felt relieved lying down, difficulty in holding urine.

Examination.—Patient is apparently in good health, says that she has never been sick, never had to "doctor." Was examined by Dr. C. Miner one month ago, who pronounced her case as cancer, advised patient to go to Lebanon Hospital for removal of uterus. The uterus was enlarged but freely movable, the external os appeared swollen, purplish blue color; the cervical canal felt

smooth, when the examining probe passed the internal os, the patient complained of pain. Withdrawal of the instrument was followed by a profuse bloody discharge and putrid odor.

Treatment.—Two daily douchings with hot permanganate solution.

Office Treatment.—A uterine electrode was passed well into the fundus. The indifferent electrode consisted of flexible tin applied over the abdomen and sacrum. A Wappler hot wire meter registered 2,000 milliamperes for 45 minutes. At the end of this time the electrode was withdrawn, followed by a profuse bloody discharge, the amount of which lessened after each application. In March, 1912, or four months after beginning the diathermic treatment, the discharge had ceased, the uterus was perceptibly smaller. Treatments were continued on alternate days until the latter part of July, 1912, patient was as far, as she was concerned and as far as any examination would show, perfectly well. Patient is now 58 and has had no recurrence. Was this carcinoma uteri?

CASE IV.

Mrs. H., American, age 40 years, came with her physician, Dr. Cooper, who had diagnosed cancerous tumor of the left breast. Patient's mother died at the age of 56 of cancer of the liver. The tumor in the breast was about the size of a hen's egg, freely movable on the chest wall but adherent to the overlying skin. Diathermia was applied in the usual manner, the hot wire meter showing 1,800 milliamperes for 30 minutes on alternate days. Three months later all trace of tumor had disappeared, previously enlarged axillary glands were normal. Patient has had no recurrence since 1914, is alive and perfectly well.

CASE V.

Miss L., American, 48 years, mother died from cancer of breast, one sister was operated for cancer of the breast, 2 years later the other breast became involved followed by radical removal by Dr. Erdman. Patient presented herself with a well-defined tumor of the right breast measuring about 1½ by 1 inch. The tumor was hard, freely movable. Diathermia was applied by fixing the mass between two electrodes of the same size. The meter showed a reading of 500 milliamperes for 30 minutes on alternate days. After four months, the mass had entirely disappeared. This patient submitted to diathermia because in the case of her elder sister some nodules recurred in the scar of the second breast removed. They disappeared under diathermia. Neither patient had a recurrence since the diathermia. In the one case, post operative examination proved to be cancer. Was the recurrent nodule in the scar cancerous? Was the tumor of the breast in the sister cancerous?

CASE VI.

Mrs. B., age 53, Italian. Mother died from carcinoma. Five children, youngest 18 years. Ceased menstruating during her 50th year. During the last year noticed occasional bleeding for one or two days.

Examination revealed a fungating mass involving the entire cervix of the uterus. The slightest touch caused bleeding, the odor was offensive. Vaginal discharge alkaline.

Treatment.—A douche of hot permanganate solution 1-5000 to be repeated twice daily, each douche to last 15 minutes.

Office treatment consisted in the application of the diathermia from a Wappler high frequency machine, the meter reading 1,700 milliamperes for 30 minutes on alternate days. When the cervical electrode was withdrawn there followed a copious "beefwashing-like" fluid 1½ to 2 ounces.

At the end of five months' treatment the cervix appeared normal in size

and appearance. This patient was treated in 1911, died at the age of 59 years in 1916 without recurrence of malignancy.

In this case the fundus, as far as could be ascertained, was not involved. Was this carcinoma?

CASE VII.

Mrs. N., 53 years, daughter of Dr. N. Referred by Dr. Coleman. Seven years ago noticed a hard lump in the right breast. In spite of internal medication (homeopathically) the tumor increased rapidly in size, it became adherent to the skin and the nipple was retracted. The patient complained of sharp shooting pain in the tumor region. Later the skin became eroded and the mass protruded. At this time the patient came under the diathermic treatment. My diagnosis, which coincided with that of Dr. Coleman, was the scirrhus types of breast cancer. Three months after diathermic treatment, the skin was healed, the tumor retracted, skin and nipple were freely movable. Six months later, the tumor was no longer palpable, a small normal looking scar was all that remained. The patient is alive and perfectly well, with no signs of recurrence to date. Clinically this growth was malignant. Was it cancer?

These seven cases have been selected because in each instance some *special factor* entered into the case. With the average case of breast tumor the diagnosis is always questionable. Neither do I wish to lay claim to heredity of cancer but I do believe that there is such a thing as a family susceptibility. In the absence of the questionable biopsy, are we warranted in assuming tumors of the breast in females in advanced age, where the mother has died from known cancer, or where a sister has had real cancer removed, to be cancerous? If a patient has a breast removed for cancer and three years later a similar growth appears in the other breast, are we warranted in assuming that to be cancerous? In fact, it matters very little what the academic view might be; the fact remains that these patients gave all the clinical evidence of malignant growths. While scientifically these cases may not have been malignant, yet they were tumor masses, they disappeared under diathermia. Clinically and physiologically, these patients were restored to the normal.

CURRENT NOTES

American Proctologic Society.

Owing to conditions brought about by the present war, the American Proctologic Society has decided not to hold its meeting in Chicago on June 10 and 11. The Society will probably not meet again until after the war is over.

Toxicity of Arsphenamine and Similar Products.

The attention of our readers is drawn to the following important note from the Hygienic Laboratory of the United States Public Health Service:

"In view of the reports in current medical literature of untoward results from the use of arsphenamine and neoarsphenamine, it is requested that samples of any lots of these arsenicals which have shown undue toxicity be forwarded to the Hygienic Laboratory for examination.

In sending these samples it should be ascertained that the lot number is the same as that of the ampoules used on patients. The samples sent should, if possible, be accompanied by a brief note stating the approximate body weight and age of the patient, the dose and dilution of the drug given, the symptoms and result; that is, whether fatal or not."

"Though no mention of other Salvarsan products, imitations or substitutes, is made in this note, it may be presumed that the Hygienic Laboratory would desire the sending of specimens of any of these which were suspected of undue toxicity, for it is evident that there is no intention on the part of the authorities to distinguish invidiously against one product.

Curious Epitaph to an Ekiomaniac.

The following inscription is found on a monument in an English church, and, as evidence of the existence in the deceased of that form of insanity which impels its victim to render the lives of those nearest to them a burden, it may interest some of the readers of the *INTERSTATE*.

Here lies the bodies of Thomas Bond and Mary, his wife.

She was temperate, chaste, and charitable, but she was proud, peevish, and passionate.

She was an affectionate wife and a tender mother, but her husband and her child whom she loved, seldom saw her countenance without a disgusting frown, whilst she received visitors whom she despised with an ingratiating smile.

Her behaviour was discreet towards strangers, but imprudent in her family.

Abroad her conduct was influenced by good breeding, but at home by ill temper.

She was a professed enemy to flattery and was seldom known to praise or commend; but the talents in which she principally excelled were difference of opinion and discovering flaws and imperfections.

She was an admirable economist, and, without prodigality, dispensed plenty to every person in her family, but would sacrifice their eyes to a farthing candle.

She sometimes made her husband happy with her good qualities, but much more frequently miserable with her many failings.

Insomuch that in thirty years' cohabitation he often lamented that, maugre all her virtues, he had not on the whole enjoyed two years of matrimonial comfort.

At length finding that she had lost the affection of her husband as well as the regard of her neighbours, family disputes having been divulged by servants, she died of vexation, July 20, 1768, aged 48 years.

Her wornout husband survived her four months and two days, and departed this life November 28, 1768, in the 54 year of his age.

William Bond, brother to the deceased, erected this stone as a weekly monitor to the wives of this parish, that they may avoid the infamy of having their memories handed down to posterity with a patchwork character.

From Wharton and Stille, communicated by Dr. Jacob Rosenbloom.

Radium Treatment of Scars.

The following are the conclusions of an article by Stevenson, of the Black-rock Military Orthopedic Hospital:

1. Radium has a distinct sphere of usefulness in the treatment of scar tissue and fibrous adhesions.
2. It is a valuable adjunct to other methods of orthopædic treatment, especially by shortening their duration.
3. Its effect is rapid, sometimes immediate.
4. It softens and mobilizes scar tissue.
5. It appears to facilitate subsequent removal of the scar by the knife.
6. It enables structures, like tendons adherent to the scar, to free themselves.
7. By loosening tendons and stiff joints it improves the functional power of the part.
8. It possesses the advantage of acting, to some extent, as an innocuous local anæsthetic for about a week.
9. It is particularly useful in treating scars and adhesions in the hands and fingers.
10. It is easily applied to the surface of the skin, and by this method causes no inconvenience to the patient.
11. To obtain the best results a single large dose is necessary.
12. The dose should not be so great as to produce inflammation of the skin.
13. With suitable dosage it appears to produce no ill effects.
14. In small doses it appears to hasten the healing of wounds, and to allay the painful inhibitory effects of the products of inflammation.—*The Lancet*, March 23, 1918.

BOOK REVIEWS.

A WAR NURSE'S DIARY. Sketches from a Belgian Field Hospital. New York: The Macmillan Company, 1918, \$1.25.

Courage, sympathy without sentimentality, and sense of humor, what an excellent combination of qualities for the ideal nurse! The one who anonymously permits us here a look into her diary surely is possessed of all of them and of a few more. Many of the nurses in the arduous work of the war probably have gone through the same experiences, have reflected in a similar vein concerning all this horror, but few will be able to tell us, who have been left behind, of their unusual experiences in such gripping, vivid, and truly charming manner.

PERSONAL HEALTH. By William Brady, M.D., Elmira, N. Y. 407 pages, 12mo. Philadelphia and London: W. B. Saunders Company, 1916; cloth, \$1.50 net.

This is a collection of sane health talks which the physician can very safely place in the hands of his patient. Without being dogmatic, the author puts his facts in a crisp, "snappy" style that makes the book most agreeable reading. Such subjects as Heat and Ventilation, Care of the Scalp and Skin, Metabolism, and Nutrition are presented in a form understandable by any individual with a grammar school education.

DISEASES OF THE STOMACH, INTESTINES, AND PANCREAS. By Robert Coleman Kemp, M.D., Professor of Gastrointestinal Diseases at the Fordham University Medical School; Gastroenterologist at the Fordham University Clinic, etc. Third edition, revised, with 438 illustrations. Philadelphia: W. B. Saunders Company, 1917; cloth, \$7; half morocco, \$8.50.

The third edition of Kemp's book maintains the excellent standard set by the previous editions. Careful attention to detail in the description of both diagnostic and therapeutic measures continues to distinguish the work, and is no doubt in great part responsible for its popularity. Charts, diagrams, and a large number of photographs are employed with the purpose of presenting the subject in the vivid manner of a clinical lecture. A special section is devoted to radiography of gastric and duodenal ulcer, gastric cancer and gall bladder disease, in addition to radiographs of other abdominal conditions. It would perhaps be useless to discuss here the author's stand on debatable subjects, such as the precancerous nature of chronic gastric ulcer or the exclusion of the pylorus in the operation of gastroenterotomy. Suffice it to say that he is not dogmatic in his statements and that his conclusions are based partly on his own experience, partly on the literature, to which he makes frequent reference. Several chapters might be omitted without impairing the usefulness of the book. The author's reason for including typhoid fever seems poorly taken; the pages on typhus are entirely superfluous. There seems no reason for inserting a chapter on the treatment of obesity. It would be equally proper to discuss the management of diabetes, gout, and the various metabolic disorders, a thing manifestly out of place in a book of this sort. We had hoped to see the term *gastrologic* discarded as a relic of the days of "symptomatic" diagnosis. It serves no useful purpose, and only tends to confuse those who attempt to regard gastric pain as a separate clinical entity.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

JUNE, 1918.

No. 6

EDITORIAL.

VIBERT.

By the death of Charles Vibert, French medicine loses one of its most admirable figures. He was, without question, the soundest exponent in France of Forensic Medicine—that is, of the application of medical and similar knowledge to the collection, the production, and the interpretation of evidence. French Forensic Medicine, though brilliant, has not always been distinguished for that conservatism which the gravity of its issues calls for.

The period of Tardieu, though marked by true progress, was also so fertile in weeds that, at one time, it seemed that these latter had overwhelmed the true grain. The task of eliminating these noxious herbs fell first on the shoulders of Paul Brouardel.

The comparison of the successive editions of Tardieu's works, edited by Brouardel, with one another and with the original is an interesting and instructive object lesson in the delicacy with which a Frenchman will handle a situation in which he is faced by the alternative of renouncing a venerated master or of being untrue to his own convictions.

The progress of Forensic Medicine since 1880 has been largely a strategic retreat, a shortening of lines, an elimination of weak and indefensible salients, a concentration in the real work in hand.

So much have medicolegal experts been occupied with these operations of consolidation and elimination, that very little that is new—and really valuable—has been contributed outside the domain of toxicology. The work of Uhlenhuth, Nuttall, Schmidt, and others on the application of precipitin tests to the specific identification of blood stains is easily the most important innovation in the field of Forensic Medicine. It is difficult, on the spur of the moment, to call to mind any other contribution to medicolegal knowledge and technic which has any claim to be compared for value with this serological discovery.

The result of this tendency to retract, this increasing conserva-

tism of doctrine, is that the soundest tests on the subject are also the briefest.

True in all countries, but especially in America, ponderous works on the subject have been published of recent years, rivaling the Encyclopædia Britannica in weight, if in no other respect. But the experienced medicolegal practitioner who turns to these for assistance and guidance in a difficult case will turn back from them with a sigh or a smile, according to his disposition and mood. Much of what these tomes contain is padding, most of it is irrelevant, too much of it is inaccurate and uncritical.

While there are, in various languages, a number of shorter texts of great helpfulness, there is one of outstanding merit. This is Vibert's *Précis de Médecine Légale*. I have an acquaintance, in the original or in translations, with the majority of medicolegal manuals written in the various languages of Europe. No one of them can compare for sureness of touch, for a nice sense of proportion, and for clarity of exposition with the small text-book of the recently deceased French master.

Vibert began as laboratory assistant and technician (*preparateur*) to Ranvier at the College of France. For more than thirty years he was chief of the medicolegal laboratory of the Faculty of Medicine in Paris and Physician Examiner of the Morgue. He had, probably, less newspaper renown than some of his contemporaries and survivors, but among the *cognoscenti* he was recognized as unexcelled.

His very soundness, appearing to the imperfectly informed and keen police officers as mere hesitation, caused occasional impatience, and doubtless they preferred to call in a less conservative colleague. This is not peculiar to the police of Paris. In a conversation with a very high police official in London, I was told that they generally turned to a certain physician for guidance and expert evidence because they found that *his evidence was of a kind that suited them*. A remark, be it emphasized, that was uttered in all good faith.

After soundness, Vibert's most distinguishing characteristic was great personal modesty; it is probable that a certain reserve which marked him had its origin in this. He was of an intellectual generosity, which, one is not surprised to learn from our obituary notice in *Paris Médical*, was coupled with great and discreet liberality.

THE TRAINING OF THE MEDICAL STUDENT.

The Edinburgh Pathological Club has opened an inquiry into the training of the student of medicine which has elicited important pronouncements on this subject from some of the leading teachers of the United Kingdom. Of these the most interesting to American

readers is a paper contributed by Dr. J. S. Haldane, of Oxford, published in the *Edinburgh Medical Journal* for April. The title of this article is, "The Relation of Physiology to Medicine." Its interest depends on the somewhat metaphysical treatment of the subject matter and on the lessons which Dr. Haldane seeks to derive from observations made during a recent visit to this country.

This famous physiologist starts with the assertion that there is a great and increasing loss of contact between physiology as it is taught in text-books and schools and the practice of medicine as a curative art.

Quoting Professor Frederic Lea, of Columbia University, Haldane agrees that, "by the end of their second year, they (students) have completed their work in physiology, and lay the subject aside with a feeling of relief as they turn to the more congenial occupations of their two clinical years. Now they acquire a new vocabulary for which all along they have been longing. . . . With the passing of the physiologic words go also their meanings, and throughout the rest of the school career, and too often the rest of professional life, physiology is merely a scientific curiosity."

The defect lies, according to Haldane, in the neglect of the study of the phenomena of organic regulation. The action of organic regulation in the body is constant, omnipresent, and of exquisite delicacy. It is the fundamental phenomenon of physiology. Yet is it scarcely adverted to in text-books on that subject. This treatment of the matter by the Oxford physiologist brings us sharply up against teleologic conceptions. This does not perturb him, for he holds that practical medicine is based, and for him properly based, on teleologic conception of the working of the body, and that, as long as this is ignored by teachers of physiology, so long will their subject be separated, if not divorced, from the practice of the healing art.

Haldane's remarks on his observations in this country cannot fail to be encouraging to those who have worked so hard and so long to place medical education on a sound basis. He says:

"Another suggestion which I should like to support is that the holders of chairs of systematic medicine or surgery should be freed from private practice. I cannot see how they can efficiently perform their very important duties otherwise, for they ought to keep in close and living contact with all parts of their subject, besides superintending the development of new forms of treatment and scientific investigation in the wards under their charge. The time has come, it seems to me, for placing these chairs on the same footing as other chairs in the medical faculty.

"In a recent visit to America nothing struck me so much as the extraordinarily rapid development of medical teaching and research in the best universities. In place of the pompous ignorance of

physiology and pathology which one meets with so often among medical teachers in Europe, there was everywhere considerable knowledge of, and enthusiastic belief in, scientific methods. Clinical laboratories, and keen young men to work in them, were appearing in all directions. Side by side with this clinical scientific activity there was an equally marked development in the pure scientific laboratories and their research work, and in the broadness of view which goes with originality. Other features were the introduction of whole-time professorships of medicine and surgery, and the system adopted by some of the leaders in American surgery and medicine of only carrying on private practice in hospitals so organized and staffed that patients could be thoroughly examined, skilfully tended and observed, and placed in the best conditions of successful treatment. I returned home with the strong conviction that we shall soon be left behind in the medical sciences unless we can introduce radical reforms."

THE EVIDENCE OF THE VICTIM IN INDECENT ASSAULT CASES.

The presence of discharges, gonorrheal or "non-specific," about the genital organs of young girls is probably the most usual starting point for suspicions of indecent assault.

Now, while purulent vulvitis, urethritis, or vaginitis may be the result of such criminal acts, it is notorious that specific (gonorrheal) discharges are common in young girls to whom no such misfortune has happened. It has not been satisfactorily shown that this is peculiar to very young girls.

Suspicion once aroused and interrogation commenced, there is the greatest danger of an injustice being done owing to the common ignorance of the psychologic peculiarities of the young girl.

Sir Astley Cooper was probably the first to point out the pitfalls of the evidence in such cases. These warnings should be addressed to the parents and other persons who initiate the investigation, since it is at the very outset that the mischief is most likely to be done.

Nevertheless the physician plays so important a role in these affairs that it is not amiss to put him on his guard, so that not only will he not himself be misled, but, by his advice and action, he will be able to prevent great wrong being done.

First of all, one must lay aside the notion that a false accusation of indecent assault is necessarily preferred in bad faith on the part of the accusers—that is, of the girl's friends.

Remember, first, that all young children like to be the center of important events; secondly, that they have little or no appreciation

of responsibility or of the consequences of their statements; thirdly, that they are very quick to pick up a hint and to learn a part.

Bearing these facts in mind, consider how parents and friends proceed to interrogate a child in such a case. The proper way is to encourage the child to tell her own tale, but to leave her to tell it in her own way. It is fatal to give the slightest hint as to the nature of one's suspicions. Therefore the leading question, which suggests its answer, is nowhere more out of place than here. Yet in practice nowhere does it play so important a part.

You will rarely find—in a false case, never—that a *child* will put forward, spontaneously, an accusation. This is usually the result of hints on direct suggestions put to her by questioners *in perfect good faith*. There is, in this way, gradually built up in the child's mind a connected and circumstantial story, which she will repeat with consistency and accuracy, just as she would a fairy story. By the time the child's evidence comes to be taken judicially the mischief is done, and it is often impossible to disentangle truth from fiction.

The difficulty and danger of these cases is increased by the impression produced, on the Court or the jury, by the often evident good faith of the parents or friends of the "victim."

So far I have been speaking of quite young girls. There is an even greater danger with those approaching the age of puberty. They have not outgrown the dramatic instinct of childhood—their desire for notoriety is often increased. Their sense of responsibility has not kept pace with their growth in sexual knowledge and instincts, while there is in many cases superadded at this period a derangement of the mental and nervous equilibrium.

The consequence is that on the slightest pretext, or without any, young girls at this age will *spontaneously* prefer false charges of indecent assault.

ORIGINAL ARTICLES.

FRACTURE OF THE ELBOW.*

By JACOB GROSSMAN, M.D.,

Chief Orthopedist German Poliklinik; Orthopedist Lebanon Hospital O. P. D.;
Assistant Orthopedist New York Post-Graduate Hospital.

About twenty-two months ago the writer reported a series of 50 cases of fracture of the elbow in the *Medical Record* (*Med. Rec.*, January 15, 1916). Since then he has succeeded in collecting 60 additional, making a total of 110 cases. These patients had been treated by the acute flexion position. In only one case was operative interference necessary. Here the displacement of the fragment was so marked and the fragment so small that replacement and retention were impossible. The fragment was removed and the patient had an uneventful recovery with complete restoration of function in the elbow joints. The average time of treatment was four weeks. We succeeded in obtaining cures in the majority and marked improvement in the remainder of the series.

It is of interest to mention that there was one case in which there was a fracture of the coronoid process of the ulna and 5 cases in which the radial head or neck were fractured. Fracture of the coronoid process of the ulna is of fairly rare occurrence. Fracture of the head or neck of the radius occurs more commonly and is very often overlooked. The diagnosis is made upon the presence of restricted pronation, supination, flexion, and extension of the elbow and marked localized tenderness over the radial head. Ecchymosis and crepitus were absent in these cases. Swelling, the result of the synovitis and hemorrhage into the joint was present in all 5 cases. The treatment of these cases did not differ materially from that of the other fractures of the elbow. The limbs were placed in acute flexion and massage, passive and active movements and baking were given ten to twelve days later. We found that the synovitis present did not in any way contraindicate movements on the tenth day as after this time had elapsed, very little fluid, if any, was present in the joint.

ETIOLOGY.

Of the 110 cases, there were 84 or about 76 percent in males, and 26 or 23 percent in females. From this one can see that the injury

*From the Orthopedic Clinic of Lebanon Hospital.

is more common in males, the proportion being more than three to one.

The injuries are more common in childhood and early adult life than in middle and later life. One hundred and five cases or 95 percent having occurred between the ages of 13 months and 15 years. There were only 5 or about 5 percent that had occurred in patients older than 15 years; of these, one was 17, one was 21, one was 29 and two were 44 years.

In the majority of the cases the fractures were the result of a direct trauma, a fall striking upon the affected elbow being the cause commonly given. In others a fall upon the outstretched palm of the hand resulted in fracture. In 2 of the cases the fractures



Fig. 1.—T. R. Supracondylar fracture of humerus. Note displacement of fragments.

were the result of muscular action. It was while throwing a baseball, both the external and internal condyles in one of the cases, and only the external condyle in the other, were fractured.

The condyles were most commonly fractured. There were 78 cases in which one or the other condyles were fractured. Of these the internal condyle was fractured more often, there being 41 internal condylar and 36 external condylar fractures. In one case both condyles were fractured. Of the internal condylar fractures the left elbow was more commonly the victim, there being 23 left and 18 of the right. Of the external condylar fractures there were 18 of the left and 19 of the right elbow.

Twenty-one cases or 19 percent were supracondylar fractures.



Fig. 2.—T. R. Supracondylar fracture of humerus. Normal extension.



Fig. 3.—T. R. Supracondylar fracture of humerus. Normal flexion.



Fig. 4.—M. S. Fracture of internal condyle. Normal flexion.



Fig. 5.—M. S. Fracture of internal condyle. Normal extension.

The right elbow was more frequently affected, there being 17 of the right and 4 of the left elbow.

Five cases or 5 percent were fractures of the olecranon process. Four were of the right and one of the left.

There were 5 cases of fracture of the head or head and neck of the radius, three being of the right and two of the left radius.

In one case the coronoid process of the ulna was fractured.

MECHANISM.

In children the elbow is a centre of traumatism because it is a point of diminished resistance. The lower end of the humerus is in

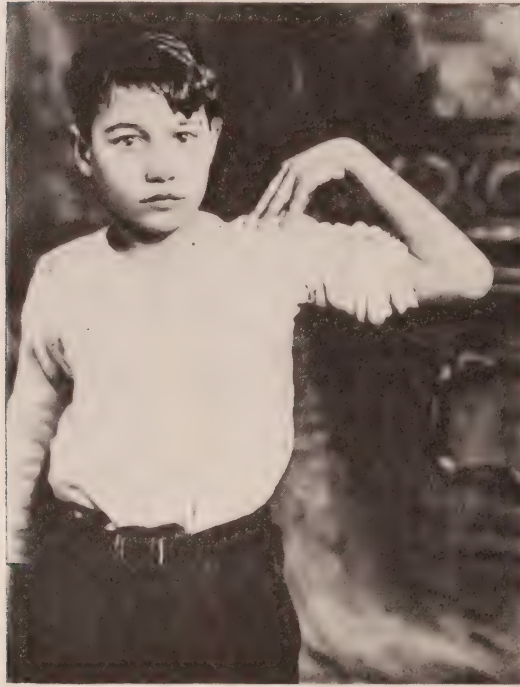


Fig. 6.—F. H. Fracture of internal condyle. Normal flexion.

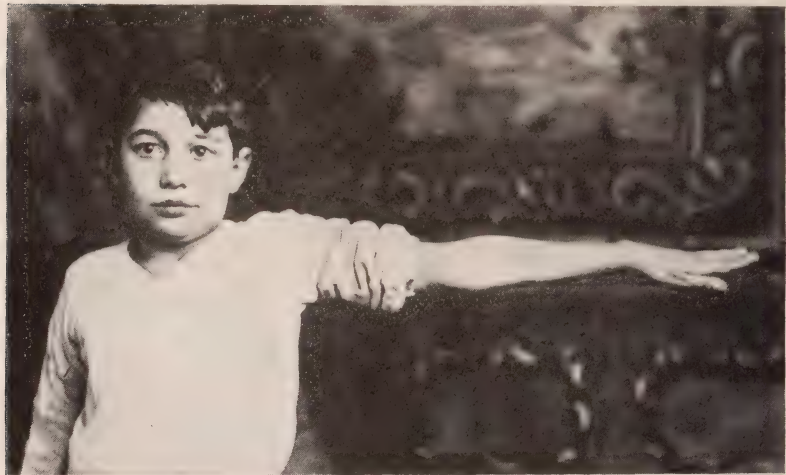


Fig. 7.—F. H. Fracture of internal condyle. Normal extension.

the process of development and ossification and is unprepared to offer resistance to an unusual strain. In the cases where children fall upon the outstretched hand, the shock is transmitted from the ground to the shoulder and is centered in the elbow, especially upon the lower extremity of the humerus and the articular end is not only broken, but the fragment usually dislocated. This is particularly



Fig. 8.—N. D. Fracture of internal condyle. Normal flexion.



Fig. 9.—N. D. Fracture of internal condyle. Normal extension.

so in supracondyloid fractures. Where direct violence, such as falls striking the elbow, or striking the elbow with an object, fractures of the condyles, head or head and neck of the radius, or olecranon process are usually the result of the force exerted upon the affected part.

SYMPTOMATOLOGY.

Subjective.—The patient usually gives a history of an injury, followed by disability and pain about the elbow joint.

Objective.—The affected limb is usually supported by the other hand. The forearm is flexed, being held at almost a right angle, midway between pronation and supination. Swelling, especially in



Fig. 10.—M. A. Fracture of external condyle. Normal extension.



Fig. 11.—M. A. Fracture of external condyle. Normal flexion.

those fractures which are intra-articular, is very marked. Ecchymosis is usually present, surrounding the elbow in supracondylar fractures, and in condylar fractures it is localized to the sides of the elbow.

Manipulation of the elbow is extremely painful. Flexion and extension, pronation and supination are restricted, the former more so than the latter. Tenderness is very marked as a rule being



Fig. 12.—R. B. Fracture of head and neck of radius.



Fig. 13.—R. B. Fracture of head and neck of radius.

localized to the affected area. Crepitus may be elicited in the majority of cases, but it is best to dispense with this sign, first on account of the severe pain which results, and secondly because the diagnosis is evident without eliciting crepitus.

In localizing the fracture it is well to remember the normal relationship which exists between the condyles and the olecranon process. In the normal elbow, when the forearm is fully extended, the tip of the olecranon and the condyles lie in the same transverse line and any modification of this normal relationship of the three bony points is due to fracture or dislocation. In supra-condyloid fractures we find that although the olecranon process is pulled backwards and upwards, its relative position is maintained, i. e., it lies in a straight transverse line with the epicondyles.

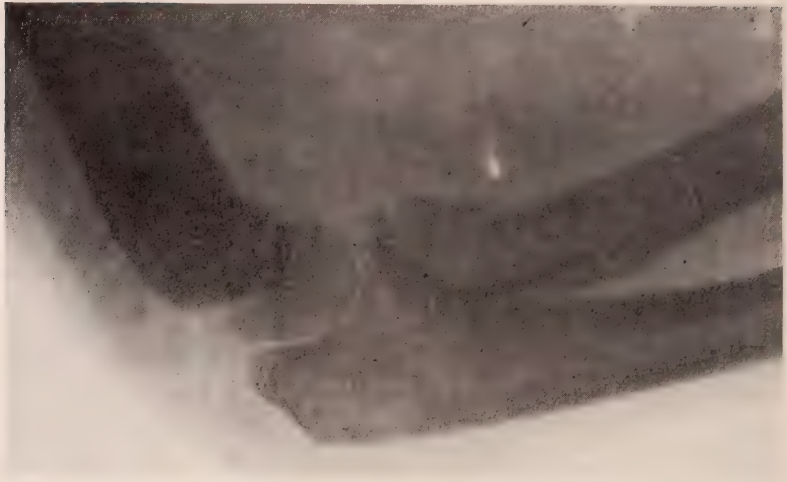


Fig. 14.—S. S. Fracture of neck of radius.



Fig. 15.—S. S. Fracture of neck of radius.

DIAGNOSIS.

There is one condition which is fairly common in children and which I wish especially to emphasize. This condition is one in which a partial dislocation of the head of the radius resulting from a trauma to the upper extremity, is present. The history of the trauma and the subsequent picture are characteristic of this condition. The child had been dragged along or lifted up by the upper extremity, following which there is disability and severe pain, when attempting to manipulate the affected extremity. The limb hangs limply at the side as if there were a flaccid paralysis. Naturally the question of a fracture about the elbow joint arises. Slight swelling about the elbow might be present. Ecchymosis, crepitus,



Fig. 16.—C. S. Fracture of head of radius.



Fig. 17.—C. S. Fracture of head of radius.

deformity, false mobility are absent. Passive flexion and extension are not restricted. Pronation and supination are limited. Upon extreme supination a clicking sound is heard and immediately thereafter the child regains normal use of the limb.

PROGNOSIS.

With the exception of those cases of fractures of the elbow primarily irreducible, such as those rare cases of impaction, or the interposition of the fragments in the joint where the intra-articular obstacle opposes reposition, a good prognosis can be given. These cases left to themselves inevitably produce unsatisfactory results; they must be relieved by surgical intervention.

There are other cases which present certain difficulties in reduc-



Fig. 18.—V. L. Fracture of coronoid process of ulna.



Fig. 19.—V. L. Fracture of coronoid process of ulna.

tion even after the clinical diagnosis and the roentgen ray have confirmed the findings and reduction seems simple. Such cases are those with very small fragments and tremendous swelling, such as inter-articular fracture of the condyle or fracture of the neck of the radius. The fragments are so small that the fingers can secure little hold, especially when much swelling is present. Many of these cases escape unreduced and result in defective consolidation. A guarded prognosis should be given in these cases.

TREATMENT.

Reduction.—Where possible an anesthetic should be given. In supra-condyloid fractures the forearm and elbow are carried up-

ward and backward and the lower fragment goes with them so that the lower end of the upper fragment lies in front of the elbow. The lower fragment is also bent somewhat forward. It is very essential to reduce this deformity, as failure to do so will impair the normal movements of the elbow joint. The following method has been employed with very satisfactory results: Flex the elbow to a right angle and then make extension with one hand, while the fragments are manipulated into position with the other. If kept in this position the recurrence of the deformity is very apt to result. Acute flexion is the only one that is likely to maintain the fragments in good position. Supinate the forearm fully and flex



Fig. 20.—Author's method of maintaining position of acute flexion.

the elbow as far as it will go. This will bring the point of the elbow forward and will push the lower end of the upper fragment backward. This flexed position is maintained by means of adhesive strips and a flannel bandage.

Where either of the condyles are fractured, there generally is displacement forward of the broken fragment. Fortunately this displacement is slight as a rule and the fracture is usually outside of the joint. It is very essential to set the fracture as accurately as possible.

Retention.—Proper retention is as essential as proper reduction in obtaining a successful issue in fractures. The method which we have employed and which has proved very satisfactory follows:

After reduction of the deformity, the bare arm is fully flexed so that the hand on the affected side rests on the opposite shoulder and

the elbow is carried well forward on the chest. In the majority of cases this position retains the fragments in proper position. The position is fixed by a strip of adhesive plaster encircling the arm and forearm just above the elbow joint. The forearm is now banded to the arm by figure of eight turns. Before applying this dressing the arm should be dried and powdered and a piece of boric acid lint or cotton placed in the elbow crease and axilla, to absorb the perspiration and keep the parts dry. The limb is retained in position by a sling around the neck. At the end of ten days the dressing is removed and careful passive movements are given.

AFTER-CARE.

In performing passive movements grasp the elbow with one hand and flex, extend, pronate and supinate the forearm to its full extent. This should be done once only at first, and repeated three times a week. Massage once or twice daily can be given. The acuteness of flexion is periodically diminished by lengthening the sling. Flexion must be maintained for at least three weeks. The object of this is to prevent the formation of callus in the coronoid fossa. Callus may form in the olecranon fossa and lead to limitation of extension, but this is of less importance than limitation of flexion. An arm that can be moved from full flexion to a little beyond the right angle is a serviceable limb, whereas, movement from full extension up to a right angle means a comparatively useless one. Voluntary movements in the form of exercises have been found to be very helpful in increasing the range of movements. The following have proved very satisfactory:

1. (a) The patient stands straight, heels together, head straight, arms extended at the sides of the body, palms being turned inward. (b) The arms are brought straight out, forming a cross with the body. (c) Then by the side of the head touching the ears and as straight as possible. (d) Return in the same manner to the position of rest.

2. The same position as above (a) start movements from the following position: The elbows close to the side, forearm bent upon the arm, fists closed with the thumb side to the shoulder. (b) Then the length of the body, (c) then in a cross, (d) then vertically upward by the side of the head, touching the ears and as straight as possible.

3. The palms upward, the arm describes a half circle, to rejoin at the sides of the head; there the fingers cross each other, the patient stretches out as far as possible and brings the arms back parallel to the side of the body by describing a half circle in a vertical plane.

4. The head straight, arms extended at the sides of the head, bend the trunk forward at the hips so that the fingers, united by

their palmar surfaces, touch the ground; return to the previous attitude with the arms in the same position.

5. The patient standing opposite a wall and an arm's length from it, stretches out the arms horizontally in front, and applies the hands flat against the wall; without moving his feet the patient slowly brings his body to the wall by bending the arms on the forearms, then he slowly recovers.

6. The patient stands straight, feet together, head straight, a rod or stick about four feet long is then grasped firmly by the hands about two inches or more from the ends and raised above the head, the hands still remaining the same distance from the ends. The rod is next lowered behind the back as far as possible. The hands must still retain their position on the rod, but the elbows must be bent. Alternately raise and lower the rod.

The efficacy of these exercises can be increased by the use of dumbbells. They should be practiced daily and not to the extent of fatigue.

A very simple and excellent exercise is to have the patient carry a weight, with the affected limb. We usually advocate the carrying of pails of water.

The following are histories in detail of cases in point:

CASE I.

Tillie R., 9 years of age, fell, striking upon her outstretched hand, sustaining an injury to her right elbow. Her chief complaints were pain and disability.

Examination.—The elbow was held flexed at almost a right angle. Swelling and ecchymosis were extensive. Tenderness which was excruciating was localized to the lower extremity of the humerus. The characteristic deformity of supra-condyloid fracture, i. e., upward and backward displacement of the lower fragment, downward and forward displacement of the lower end of the upper fragment, was evident. The normal relationship of the three bony points of the elbow was not disturbed. Flexion, extension, pronation and supination of the forearm were all restricted and very painful.

Diagnosis.—A diagnosis of supra-condyloid fracture of the humerus with displacement of the fragments, was made. Subsequent x-ray picture confirmed the diagnosis. (Figure 1.)

Treatment.—Reduction under an anesthetic and retention in acute flexion.

Subsequent History.—Uneventful convalescence. Figures 2 and 3 show complete recovery at the time of her discharge.

CASE II.

Monty S., 10 years of age, fell striking his left elbow. He complained of severe pain and disability of the left elbow.

Examination.—The left elbow was held in flexion of about 110 degrees. Swelling and ecchymosis were slight and localized to the inner aspect of the elbow. Tenderness was marked and localized to the internal condyle. Crepitus, false mobility and deformity were absent. Flexion, extension, pronation and supination were restricted and painful.

Diagnosis.—A diagnosis of fracture of the internal condyle, which was made, was confirmed later by an x-ray picture.

Treatment.—Acute flexion followed by massage, passive movements and exercises.

Subsequent History.—Uneventful recovery. Figures 4 and 5 are photographs taken at the time the patient was discharged.

Figures 6, 7, 8 and 9 are photographs of other cases of fracture of the internal condyle, taken at the time of their discharge.

CASE III.

Max A., fell striking his elbow. His chief complaints were pain and disability.

Examination.—Elbow held flexed a little beyond a right angle. Swelling, ecchymosis and tenderness localized to the outer aspect of the elbow were present. Flexion, extension, supination and pronation were restricted and painful.

Diagnosis.—Fracture of the external condyle was made, which was confirmed later by an x-ray picture.

Treatment.—Acute flexion, followed by treatment prescribed. This patient made an uneventful recovery. Figures 10 and 11 were taken at the time of his discharge.

CASE IV.

Raymond B., 10 years of age, fell striking his elbow. Examination of the elbow revealed no loss of function, no swelling or displacement of any of the three prominences. There was, however, excruciating tenderness at the upper part of the radius. A diagnosis of fracture of the head of neck of the radius was made, which was subsequently confirmed by an x-ray picture. (Figures 12 and 13.) Treatment consisted of acute flexion followed by the routine measures previously described.

SUMMARY AND CONCLUSIONS.

1. Fracture of the elbow occurs commonly in children.
2. Males are more frequently affected than females.
3. Acute flexion is the best position for all fractures of the elbow except fractures of the olecranon process. These latter should be retained at almost complete extension.
4. Passive motion, massage and exercises should be given early. The tenth to the twelfth days are very good times to begin. Continue this treatment until the movements of the elbow are normal and free from pain.
5. Displacement of the fragments must be guarded against when passive movements are begun as faulty reduction causes periosteal proliferation that may lock the joint.
6. Fracture of the head and neck of the radius while not a common condition, occurs often enough to be considered while making diagnosis of injuries to the elbow.

THE SLEEP OF AN INSOMNIA SUFFERER AS RECORDED BY HIMSELF.

By JACOB ROSENBLOOM, M.D., Ph.D., of the Editorial Staff.

The following table, prepared by one of my patients, a man far advanced in years, may prove of interest to clinicians. The form and expressions of the original have been adhered to. This record is probably as accurate as circumstances permit.

MONTHLY SLEEPING AVERAGES.

In 1900 commenced using "soporifics" under advice of physician, trional and sulphonal. In 1906 added veronal. Number of doses taken shown for each month. No account taken of "sedatives" (sic), such as bromide and chloreton.

Year	Jan. Hours Min.	Feb. Hours Min.	March Hours Min.	April Hours Min.	May Hours Min.	June Hours Min.	July Hours Min.	Aug. Hours Min.	Sept. Hours Min.	Oct. Hours Min.	Nov. Hours Min.	Dec. Hours Min.	Number of doses soporifics	Yearly averages Hours Min.
1894	5.40	5.48	5.48	5.36	5.52	5.31	5.35	5.40	6.06	6.07	5.26	5.53	..	5.45
1895	5.40	5.45	5.57	5.40	5.58	5.46	6.—	6.03	5.54	6.05	5.50	5.55	..	5.54
1896	5.37	5.38	5.31	5.43	5.36	5.37	5.44	5.58	5.51	5.33	5.56	5.43	..	5.44
1897	5.40	5.33	5.40	6.—	6.02	5.27	5.57	5.58	6.—	5.52	5.39	5.37	..	5.47
1898	5.21	5.30	5.35	5.25	5.12	5.32	5.31	5.30	5.38	5.42	5.20	5.21	..	5.28
1899	5.16	5.32	5.31	5.20	5.28	5.27	5.48	5.36	5.42	5.37	5.24	5.29	..	5.31
	(3)	(8)	(9)	(7)	(3)	(7)	(7)	(9)	(11)	(6)	(9)	(7)		
1900	5.17	5.19	5.24	5.17	5.10	5.19	5.38	5.40	5.46	5.46	5.23	5.31	86	5.28
	(6)	(7)	(11)	(8)	(6)	(7)	(4)	(4)	(4)	(4)	(8)	(9)		
1901	5.25	5.34	5.44	5.26	5.17	5.10	5.13	5.15	5.25	5.32	5.18	5.36	78	5.25
	(5)	(3)	(4)	(5)	(4)	(3)	(3)	(4)	(3)	(1)	(5)	(7)		
1902	5.31	5.25	5.24	5.25	5.20	5.15	5.59	5.35	5.23	5.10	5.14	5.25	47	5.22
	(3)	(4)	(4)	(3)	(5)	(7)	(4)	(5)	(6)	(4)	(5)	(3)		
1903	5.11	5.30	5.25	5.05	4.51	5.—	5.05	5.07	5.13	5.05	5.04	5.11	53	5.09
	(4)	(1)	(1)	(1)	(2)	(4)	(4)	(3)	(2)	(3)	(4)	(5)		
1904	5.10	5.04	5.16	5.14	5.08	5.14	5.12	5.23	5.18	5.26	5.09	4.50	33	5.12
	(3)	(3)	(4)	(1)	(2)	(2)	(1)	(1)	(2)	(2)	(2)	(3)		
1905	5.22	5.02	5.14	5.—	5.06	5.04	5.07	5.01	5.10	5.12	4.58	4.53	21	5.07
	(1)	(2)	(3)	(6)	(7)	(4)	(4)	(4)	(1)	(4)	(3)	(2)		
1906	5.03	5.22	4.56	5.02	4.55	4.50	5.04	4.59	4.58	5.03	5.—	5.09	41	5.02
	(4)	(2)	(4)	(1)	(2)	(2)	(2)	(4)	(2)	(4)	(4)	(3)		
1907	4.53	5.04	5.04	5.03	5.10	5.25	5.20	5.04	5.06	5.10	4.55	4.49	31	5.06
	(2)	(1)	(2)	(1)	(1)	(2)	(4)	(5)	(4)	(2)	(3)	(1)		
1908	4.32	5.03	5.16	5.05	4.58	4.47	5.19	5.05	5.01	5.—	4.57	5.08	28	5.02
	(3)	(1)	(1)	(3)	(2)	(1)	(1)	(3)	(1)	(1)	(2)	(4)		
1909	5.10	5.17	5.10	5.04	5.—	5.07	4.52	5.13	5.02	5.08	5.09	5.01	23	5.02
	(4)	(1)	(1)	(4)	(3)	(3)	(3)	(4)	(3)	(2)	(2)	(2)		
1910	5.03	4.41	4.30	5.07	4.55	5.13	5.06	4.56	4.58	4.51	4.51	4.36	33	4.54
	(3)	(2)	(2)	(2)	(1)	(1)	(1)	(1)	(2)	(1)	(1)	(1)		
1911	5.03	4.59	5.07	5.—	4.59	4.49	4.59	5.01	5.01	4.49	4.50	5.10	18	4.59
			(1)	(1)	(1)	(1)	(1)			(1)	(1)			
1912	4.40	5.09	5.01	5.05	5.03	4.50	4.50	4.56	4.48	4.46	4.44	4.44	5	4.53
						(1)	(1)			(1)	(3)	(1)		
1913	4.58	4.54	5.07	4.40	4.50	4.54	4.51	4.43	5.03	4.59	4.52	3.30	7	4.47
			(4)	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)			
1914	3.55	4.18	4.41	4.56	5.05	5.04	4.48	4.49	4.41	4.34	4.47	4.17	13	4.40
	(1)	(4)	(1)		(1)	(1)		(2)	(1)	(1)	(1)			
1915	4.14	4.32	4.47	4.48	5.02	4.59	4.51	4.41	4.42	4.41	4.42	4.23	13	4.41
	(1)			(1)					(1)					
1916	4.22	4.38	4.39	4.52	4.55	4.34	4.51	4.37	4.50	4.39	4.48	4.47	4	4.43
					(1)									
1917	4.42	4.53	4.53	4.45	4.53	4.54	4.38	5.08	4.52	5.04	4.50	4.42	1	4.51

The figures in parentheses show number of doses of "soporifics" taken during the month.

ROENTGEN RAY OBSERVATION OF THE APPENDIX, WITH SPECIAL REFERENCE TO TECHNIC.

By CHARLES E. HOWARD, Lewistown, Ill.

The profession, for an indefinite period of time, has endeavored to minimize errors in diagnosing pathology of the appendix, and especially chronic appendicitis and its complications. The roentgen ray examination of the terminal ileum region has, to a great extent, eliminated some of the possible errors of diagnosis.

Relative to roentgen ray diagnosis of acute appendicitis, at the present writing, I am sorry to say its aid is somewhat limited, and fortunately the clinical picture is most frequently rather definite.

When it is considered advisable to give a barium meal in acute appendicitis, fluoroscopic examination of the patient will visualize the ileocecal region, as to location and points of tenderness, whether near the appendix base or not. The appendix is not visualized in acute appendicitis if sufficient inflammation exists to obstruct the lumen, and only that portion not obstructed, adjacent to its base, may be visualized. As you all know, the abdomen is frequently opened anticipating appendiceal pathology, the anticipation is not realized, but a diagnosis is made or the cause positively elicited—it may be stone in the lower right ureter, or tubercular peritonitis, or gall bladder pathology, or tubercular mesenteric gland, or some other disease whose symptoms closely simulate acute or chronic appendicitis.

I shall deal principally with chronic appendicitis at this time, and will put forward confirmatory data which in our hands, with other clinical findings, enable us to diagnose chronic appendicitis.

Drs. George and Leonard, who have not as yet been surpassed in the literature on the roentgenology of the gastrointestinal tract, make this statement: "We claim that out of a meal of buttermilk and barium, in every instance, unless the lumen has been obliterated, the appendix will fill and it will remain so long enough to be demonstrated on the roentgen plate or roentgenoscope. To this statement, we believe, there is no exception."

If this statement is true, and it is rather authoritative, one can readily see the great advantage the roentgen examination gives us in differentiating the symptom complex of chronic appendicitis. Other men of prominence in roentgen laboratory work are confirming this statement.

Realizing the importance of roentgen examination in clinical

procedure, I am going to give you in concise form Drs. George and Leonard's technic of roentgen examination of the appendix.

The character of the opaque meal is the all-important factor. Ninety grams, or 3 ounces, of barium sulphate in a pint of buttermilk is the meal which will allow the appendix to be satisfactorily visualized. It has been suggested that the fermented milk reaches the cecum in a more fluid state than the other media. Then, again, its acid reaction, or possibly even the presence of the lactic acid bacillus, may have some bearing on the matter. These men say they know from four years' experience that the buttermilk meal is of fundamental importance in visualizing the appendix. The lumen of the appendix is occasionally filled by the enema method.

Secondarily, attention must be called to the necessity of careful plate work. The roentgenoscope, to be sure, has a place in the study of the appendix. But, as a matter of fact, the appendix shadow, in not a few cases, is threadlike and oftentimes but a series of three or four dots, so that its study becomes a matter of fine detail, and frequently plates are essential.

Case first emphasized, in his work, the importance of the patient's position, laying great stress on the advantage of the horizontal position, and this position I believe the most suitable.

Plates are made both from the front and from the back. The upright position may occasionally bring the appendix to view when others fail. In a few cases a retrocecal appendix may be shown by means of what is called the lateral oblique view. In this position the posterior surface of the cecum is shown in profile. The patient lies with his right side on the plate. He then rotates on a longitudinal axis, so that the plane of the abdominal wall forms an angle of about 67° with the plate. A retrocecal appendix may also be shown by waiting until the cecum is practically evacuated, twenty-four to thirty-six hours after the meal, when the appendix can be seen through the shadow of the cecum. If one fails to locate the appendix thus, the screen may be of aid. Manipulation may be necessary to bring the appendix to view if hidden behind the cecum or coils of ileum. These can be held or pushed to one side with gloved hand or wooden spoon.

Once having located the appendix, then plates can be made. The screen, associated with palpation, furthermore can give evidence of appendiceal adhesions and possible relation of any tender point to the appendix.

The six-hour and twenty-four-hour plates are the ones most likely to show the appendix. The appendix probably begins to fill shortly after the meal enters the cecum. However, the twenty-four-hours' plate usually shows the appendix best, for in the earlier plate coils of barium-filled ileum tend to cover it over. Later plates should

be made if it be important to determine the length of time which the appendix retains the opaque salt.

In order to recognize the pathological appendix, we first familiarize ourselves with its normal appearance. The appendix is made visible by the meal in its lumen or by fecal concretions which it may contain. The concretions may be mistaken for calculi in the ureter. The filled appendix appears on the roentgenogram as a linear shadow, apparently projecting from the inner edge of the cecum. The distal end floats free in the abdominal cavity. It may lie vertically behind the cecum, or horizontally along the pelvic brim, or hang over the pelvic brim into the pelvis. It may be high in the abdominal cavity, even above the iliac crest, or low in the pelvis, depending on the position of the cecum. It is freely movable under palpation. It varies in length from an inch or less up to eight or nine inches. Its width ranges from a quarter of an inch to the diameter of a thread. It may be perfectly straight, curved, or obtusely angulated.

The appendix usually shows as a dense homogeneous shadow. It may frequently appear segmented, as a series of dots or dashes. This appearance may be produced by contractions of circular muscle fibers in the appendix wall.

It is to be remembered that the normal appendix may intermittently fill and empty. When the first plate is made, the appendix may be empty, but another plate made five minutes later will find it full. The normal appendix does not retain barium for any longer time than does the cecum. One source of error is to confuse a small residue in the terminal ileum for the appendix shadow.

Chronic appendicitis may be shown by:

1. Absence of the appendix shadow.
2. Abnormal conditions of position, shape, and size of the lumen.
3. Concretions.
4. Tender-point.
5. Adhesions.

To repeat, every normal appendix will show on the plate. Without history of appendectomy, an absence of the appendix shadow means either that its lumen has been at least partially obliterated by old inflammation, or is obstructed by a possible kink, or it may be so filled with mucus or concretion that the barium cannot enter. It is conceivable that an acute inflammation could so congest the walls that the lumen would be obliterated. In any case the appendix is pathological. This is all the more certain if, with the roentgenoscope, tenderness is elicited over the appendix area.

A retrocecal appendix should be regarded with suspicion. However, it is believed that a normal appendix may occupy this position, but it will be freely movable. A retrocecal appendix that is fixed is, nine cases out of ten, pathological.

The size of the appendix, we have found, is of no special pathological significance. Very rarely dilatation can be demonstrated, either of the whole appendix or the tip. This means at some point there is obstruction, which prevents emptying. This condition is more or less characteristic of acute appendicitis.

Variations in shape may be caused by concretions, kinks, and adhesions. Some of the curves seem at times to almost give the appearance of kinks. All these conditions we consider abnormal.

The presence of concretions is certainly pathological. Concretions, because of their density, may show independently of the opaque meal. They may be mistaken for calcified tubercular glands, phleboliths, or ureteral calculi. In the filled appendix they cause definite defects. They appear as small circular vacuoles within the appendix shadow.

Palpation, with the roentgenoscope, may reveal tenderness over the appendix. When found, this phenomenon is quite pathognomonic of appendicitis.

The writer remembers one case where pressure of the tip of the appendix caused exquisite pain. The patient was operated upon the following day. The end of the appendix was dilated, filled with pus, and about ready to rupture.

Stasis in the appendix at least suggests possible future trouble. One frequently sees barium retained in the appendix a week after the colon has been emptied. Case reports a case where the appendix still retained barium on the twentieth day. Pirie mentions a case where the barium was present on the forty-third day. This is a fertile field for the formation of fecaliths, with sooner or later definite appendicitis.

Evidence of adhesions may be shown by the roentgenoscope or by serial plates made with the patient in several positions. Adhesions involving the appendix itself tend to hold it fixed in a position. The demonstration of a permanent fixation between the appendix and some other organ of the abdominal wall is of pathological significance. Such a condition is best shown by palpation under the screen. The appendix may be retrocecal and adherent to the cecum or bound down to the posterior wall. We have seen the tip of the appendix adherent to the gall-bladder and, on one occasion, adherent to a mass of adhesions about a duodenal ulcer. The appendix may be fixed about a loop or terminal ileum, or even a portion of a redundant sigmoid. Occasionally the appendix will be held in the pelvis by pelvic inflammation.

Adhesions may deform the appendix itself, as well as shown by a condition of permanent kinking. Frequently a kink will show better with the patient in the upright position.

With regard to adhesions about the cecum, ascending colon, and ileum, which probably bear a causal relation to appendicitis, I think

better conclusions can be drawn in most instances by fluoroscopic examination. However, plates find a place of importance in not a few cases.

On several occasions I have found the cecum low down in the pelvis, and in such instances, unless by manipulation the ileocecal region can be brought up in position, it cannot satisfactorily be palpated at the time of visualizing. In such cases, by placing the patient face downward and carefully manipulating with the gloved hand, this region can often raise the terminal ileum to a position where palpation will aid markedly in eliminating possible adhesions. Inflating the colon or not emptying the bladder for a long period of time may help to accomplish the desired manipulation.

At the present time I believe that, when the buttermilk and barium meal is given for the purpose of examining the stomach, it is an unpardonable error to the patient if examination is not made in six hours, when normally the cecum and ascending colon should retain all of the meal, to ascertain the condition of the appendiceal region. If such abnormal conditions seemingly exist at the six-hour examination, the patient should be fluoroscoped two hours later and, if possible, at the end of twenty-four hours.

It may be necessary to take stereoscope plates of the ileocecal region. A repeated examination in order to learn the true conditions of this region, as well as the colon, might be advisable, especially if the stomach patient comes in unprepared for intestinal examination. Also, at this time of the second examination the stomach findings of the first meal can be checked up with those of the second meal.

R. Walter Mills, of St. Louis, in the *INTERSTATE MEDICAL JOURNAL* gave a classification of roentgen ray patients into hypersthenic, sthenic, asthenic subjects. For example, the hypersthenic gastrointestinal tract should have the buttermilk-barium meal through the terminal ileum much sooner than either of the other types; the sthenic type should have the meal in the cecum in six hours, the hyposthenic should be slower, and the asthenic much slower. So you can see the time to examine the appendiceal region cannot be made the same in all subjects.

Again, the mass in the cecal region may cover the appendix at the six-hour interval, and a few hours later the mass has changed its position, and the second examination will reveal the condition present.

Pathology of the appendix unquestionably produces abnormal effects on remote organs, and especially on the stomach. Invariably with a diseased appendix we shall find errors in the stomach function, such as hypermotility, a spasm in the center of the stomach, pylorospasm, spasmodic hour-glass contractions, and atonic conditions.

Pressure over the diseased appendix may cause visualized spasm of the stomach wall. Barkley says that "chronic appendicitis causes an impairment of the ileopyloric reflex, producing appendix dyspepsia." Intestinal stasis, cecum and colon stasis are frequently the results of adhesions following appendicitis, and such conditions can be shown by screen or plates.

Enterospasm is frequently observed in chronic appendicitis, especially of the transverse colon.

I have observed several cases of chronic appendicitis where the conditions present were causing a partial blocking of the peristaltic waves, and consequently a marked delay in the transit of the bowel contents, and in all of these subjects there was found marked disturbance, and I am convinced the ileocecal region had much to do with the cause of the nerve irritability in each case.

CONCLUSIONS.

In every stomach roentgen examination the ileocecal region should be examined. The appendix region should be fluoroscoped, and roentgenograms taken if indicated, whenever a differential diagnosis is suggested.

When chronic appendicitis is suspected, roentgen examination should be made before operation.

When the appendix fails to fill with the buttermilk meal, we must conclude it is abnormal.

Roentgen examination of the right iliac fossa will often clear up the cause of constipation, autointoxication, nerve irritability, and some types of stomach irregularity.

I will give you clinical findings and history of two interesting cases I have examined, and show you the plates taken in each case.

CASE I.

Female, aged 34, married, no children. Seamstress and vocalist. Has had poor health since a child. Patient states she cannot remember when her health was good for any period of time. All her life she has had attacks of indigestion (seldom vomiting) until of late years, and then usually vomitus, mucus in character. Between attacks she would have fair health; intervals would be from ten days to two or three months. Several times she has had a recess of six months. She has always been very nervous, and she states, owing to delicacy of stomach, she could never gain constitutionally to any extent. In a few days after eating rather heartily she could notice the return of her stomach symptoms. The last ten years she has become much worse; ten years ago went to California, hoping to get relief. She had to abandon her work, gave up public singing, and, in spite of all medical care, seemingly grew worse.

At the time of coming to me she was eating once and possibly twice daily, then very little, was not sleeping, and had not averaged three hours sleep in twenty-four hours for weeks. After losing sleep for days she has experienced going into a sleep and could not be awakened for twenty-four to forty-eight hours. After waking would feel better. She was having attacks in which she would be somewhat rigid in back of neck, arms, hands, and legs. I have

seen her in three attacks of this character, and each time she has been eating more than usual, and the last meal, seemingly, did the work. She has numerous pains here and there over the body.

Stomach distress at times, much bloating, bowel action fairly normal, distress in bowel at times; menstrual period very irregular, intervals of two to four months up until six months ago, then menstruated each month, sometimes late, sometimes before anticipated time.



Fig. 1.—Case I, plate 1. Plate taken twenty-four hours after first meal and immediately after 8-ounce meal. Note ring-like appearance of appendix around ileum about 2 inches from cecum attachment. Note immotility of stomach.

Family History.—Negative, except one sister has nerve attacks of peculiar character and constitutionally is below standard.

Physical Examination.—Defect in vision, corrected by glasses, normal eye reflexes; mouth and throat normal; chest normal, except heart very weak; tenderness over pyloric area; patient nauseated on palpation, abdomen tender generally. Vaginal examination developed abnormal condition of right appendices, not positively diagnosed. Knee reflexes exaggerated. Blood pressure, —systolic, 98; diastolic, 80; hemoglobin index, 75.

Stomach Analysis.—Six-hour rice and raisin meal, stomach empty; 60-minute toast and tea meal—quantity, 40 cubic centimeters; total acidity, 66; free hydrochloric acid, 50; combined acids, 60. Starch digestion, second stage. No other finding of importance. Blood examination, negative.

Urinalysis.—Twenty-four-hour quantity, 240 cubic centimeters. Acidity degrees, 119; urea, 4.56 grams; trace of sugar, also indican; marked re-



Fig. 2.—Case I, plate 2. Plate taken eight hours after plate 1. Rectum was flushed before plate was taken. Note stasis of ileum, retention of meal in stomach, and cap duodenum partly filled and not emptying.

action to skatol, acetone, and diacetic acid; marked deficiency in chlorides, phosphates, sulphates, and ammonia.

I tried to correct the hyperacidity and unbalanced urinalysis by dieting and alkalies, and she made some improvement. I then gave her a roentgen examination of the gastrointestinal tract and made a diagnosis of duodenal irritation, chronic appendicitis with appendix looped around the ileum, and stasis of ileum. I say duodenal irritation because this patient had the classical findings of duodenal ulcer from the roentgenologic standpoint. This not being confirmed by serial plates, however, the hyposthenic condition present made me

think operative correction of the ileocecal region would do wonders for the pyloric region as well as for the general constitution.

Operative Findings.—Chronic appendicitis, with adhesions about ileum; cystic hypertrophic ovary and chronic salpingitis with adhesions attaching to omentum, ileum, and broad ligament.

CASE II.

Male, aged 49, married, two children living, below standard in health. Patient states he has had gastrointestinal trouble for 25 years, beginning with



Fig. 3.—Case I, plate 3. Plate taken forty-eight hours after second meal. Note appendix partly filled in nearly same position, slightly higher than in plate 1.

acute diarrhea, which became chronic, and he had exacerbation of attacks for 15 years. His stomach never gave him much trouble, except at attacks; would then become nervous, followed by emesis. He did not eat heartily the first ten years, but after this time ate freely and seemingly got no worse and sometimes got better. Patient got very low constitutionally and went up and down for 15 years; visited several water cures and one sanatorium. About the sixteenth year patient developed focal diseases of posterior nares region; had four or five operations of this region during the following next five years. During this period patient was up and down in health; seemingly no resistance,



Fig. 4.—Case II, plate 1. Plate was taken twenty-four hours after first meal and immediately after a stomach meal. Note low position of cecum in pelvis, ring-like appearance of appendix around cecum, and marked colitis of last half of transverse colon extending down the descending colon.

took cold very easily; would have attacks of numbness of hands and feet, especially of right side; would pass much mucus from bowel at times; never very nervous, more marked opposite condition. Five to six years ago developed attacks of faint feelings, and three or four times fell to ground unconscious for short time; last eight years has had much dental service. Five years ago gave up all business, was confined to house, at intervals, during greater part of following two years. During last five years infection of the posterior nares region caused most of his house confinement. During last five years he has had very little bowel trouble, unless he takes cathartic, causing several bowel actions, which would set up distress of rectum and bladder all this time very weak.



Fig. 5.—Case II, plate 2. Forty-eight hours after first meal was given. Note appendix ring much higher (also the cecum as a whole), dilated cecum twenty-four hours after last meal, and colitis of last half of transverse and full length of descending colon.

Family History.—Negative.

Clinical Findings.—Patient states that when the acute infection of nares occurs, especially of left side, left eye vision is very poor; gets so bad he cannot read at times. Myopia correction by glasses. Patient's hair heavy and rapidly getting gray. Sallow and oily facial appearance, very slow in action and talk, states can sleep all the time. Has had bad odor to body, states garments are stained under arms from perspiration to yellowish color. Has had odor to breath and badly coated posterior tongue, this condition existing for years. "Mouth full of metal;" tonsils atrophied. Eyes react poorly to light; all reflexes lost.

Septum of nose resected, both antrum drained, history of tumor removed from right posterior middle turbinate region. Sphenoidal sinus discharge on right side.

Chest seemingly normal, except that heart action very weak and slow—60 beats per minute.

Abdomen tender, and history of uneasy feeling over cecum and colon. Wassermann test negative. Stomach analysis—6-hour test quantity, 50 cubic centimeters withdrawn; reaction neutral; no chemical reactions. Sixty-minute meal, 150 cubic centimeters withdrawn; total acidity, 50; free hydrochloric acid, 40; combined acidity, 45; starch, second stage digestion. Very little mucus. Large amount of bread particles. Urinalysis—24-hour specimen; quantity, 1,460 cubic centimeters; specific gravity, 1,004; total solids, 13.61; hypoacidity; urea function low, 7.3 grams (should be 14.68 at this age); sugar negative; large quantities of indican and skatol; trace of bile; chlorides; phosphates, and sulphates in excess; ammonia low, .2 gram.

Blood pressure—systolic, 110; hemoglobin, 90. This patient was treated for some time for gastric atony, hypochlorhydria, intestinal toxemia, and colitis. He made considerable improvement, gaining about thirty pounds, and is doing considerable work. He continues to have his ups and downs, and I recently gave him a roentgen examination of gastrointestinal tract. My findings were: hyposthenic stomach, 6-hour residue, transit of meal markedly delayed at ileocecal region, appendix filled, but bound down and around head of cecum. Diagnosis: hyposthenic stomach, chronic appendicitis with appendix attached around cecum by adhesions, cecum and ascending colon dilated; marked colitis and delayed movement of colon content. Operation confirmed the roentgen diagnosis of the ileocecal region; many adhesions were found embarrassing the peristaltic movements.

THE VALUE OF MILK SEDIMENT SMEARS.

By D. M. LEWIS, M.D., New Haven, Conn.

In 1911 I offered statistics to show a very exact relationship between infected milks and infantile diarrheas as being a measure of the value of examining municipal milk supplies by the Stewart sediment smear method.¹ Two years later I showed that a differential stain was the essential for the exact determination as to what constituted pus in milk.² At that time I stated that clumped pus, in any number whatever, accompanied by a certain morphological streptococcus, meant garget and that such findings warranted exclusion of the dealer's milk; that, not only was the finding exact, but that the results expressed by lessened diarrheas were proportionate to them, as well as to the continued higher rates of cities who used the bacterial count only.

Continued observations of such smear examinations for a period now of over ten years have afforded me further confirmation as well as further practical knowledge of the value of this work. From an average yearly examination of over 4,000 specimens, I am convinced that the method merits the same exact place as cytodiagnosis holds for internal medicine.

Whatever the source for human diagnostic work, whether blood, transudates, or exudates, the two essentials are centrifugalization and differential count by a proper stain. It has taken years for internal medicine to appreciate the absence of value of a leucocyte count unless accompanied by a differential. It apparently will take as many years to appreciate a similar position of the Prescott-Breed method of counting 1/100 c.c. of milk and staining it with a simple stain. When we apply a knowledge of cytodiagnosis, accentuating the similar methods used in human cytology, and neglect straining after microscopical accuracy of mere counts, it may be demonstrated that, whatever the dilution of the resulting product of many producers, garget in any one cow of many herds may definitely be demonstrable. I have yet to find a single instance where the producer himself or a veterinary failed to demonstrate the affected cow. Again, the simplicity with which dirty milks are expressed by bacterial flora has continued to be extremely satisfactory.

The value of the finding of red blood cells as showing cows milked too soon after parturition was and continues to be self-evident. The demonstration of minor infections characterized by clumped pus, an endothelial content, and varying organisms, other than the

previously mentioned streptococcus are as definite. Classed as minor infections not garget such findings have been traced back to local abscesses, of teats, tail, and even infections of the genitalia. I have had frequent corroboration that pus cells clumped, accompanied by varying streptococci, have not been garget, and have not been accompanied by milk infections in users of the milk, as contrasted with the frequency of true garget and accompanying infections.

Previously I stated that the amount of eosinophilic and endothelial cell content of a true gargety specimen was not understood. The past seven years' work has shown me that such findings are a very true pathological picture of the duration of the process. From the practically purely polymorphonuclear content of a fresh garget, there grades, through the subacute with increasing eosinophilic, to the chronic stage of frequently predominant eosinophilic with a content also of endothelial cells, where only the demonstration of the peculiar streptococcus gives the clue.

Of even greater importance are the observations that have extended over the entire ten-year period with reference to the demonstrable presence of what Maher has called the yeastoid bodies. Previous to this time I had occasion to illustrate some of his papers presented before the congresses on tuberculosis, showing the relationship of these bodies to tubercle bacilli. During the first year of my work on milk sediments, my attention became centered on the presence of these Schöns capsule bodies in samples of milk sent in, by veterinarians, from tuberculous or suspected tuberculous cows. Of 46 consecutive specimens, 19 showed these bodies and, of the latter number, there were 4 in which the tubercle bacillus as well was demonstrable. In one herd, on individual cow examination, these bodies were localized to one cow. That cow was removed by the State Commissioner, on examination, as tuberculous. In an examination of three samples from as many cows sent in by one veterinary, these bodies were found in all the samples, although tubercle bacilli were not demonstrable. These cows were known or suspected instances of lung tuberculosis. In one instance a dealer before purchasing a cow which he suspected as being tuberculous, sent me a specimen of the milk. The bodies were present, tubercle bacilli not being demonstrable. The cow was later proven tuberculous. Having established a reputation on such findings, I set out to attempt to prove the same to my satisfaction. From a herd of 18 cows which had never been tested, I obtained individual cow samples. One only showed tubercle bacilli. In that all the specimens were clean milk, they were allowed to stand at room temperature for one week, and then reexamined. In no instance were tubercle bacilli found. In one specimen these bodies were found, and that specimen the one where tubercle bacilli had originally

been found. From another source 12 cows, which were said to have been tested, were examined, half the number being cows under six years of age. In both groups one cow each gave these bodies and tubercle bacilli as well. The owner then found that both were new cows and had never been tested. Interested in my findings, Dr. Lyman of the Gaylord Farm Sanatorium sent me samples from his entire herd of 16 cows supplying milk to the tuberculous patients. In two instances these bodies were demonstrable, one of which also showed tubercle bacilli and non-acid resisters the counterpart of the tubercle bacilli. A third instance showed tubercle bacilli only. The entire herd was then tested. The three cows corresponding to the above findings alone reacted. Autopsy confirmed the tentative diagnosis and gave important data. The cow showing tubercle bacilli had udder tuberculosis. The others had gland and lung tuberculosis. This confirms the findings mentioned previously where lung tuberculosis existed and these bodies, with the absence of tubercle bacilli. During this time I was recording the frequency of the bodies in routine work, finding them in 10 percent of the first 1,000 samples. In 7,500 samples of the following two years, I found them in approximately 8 percent. Parenthetically, it is of interest that, later, a similar frequency of tubercle bacilli was demonstrated by other observers in market milk, notably at Washington, D. C.

That these bodies are an involution form of the tubercle bacillus is convincing from the investigation of spinal fluids, sputa, throat cultures, sinuses, and urines; repeated examinations over periods of time where these bodies have been found have led to the eventual finding of tubercle bacilli and to the diagnosis of and confirmation of tuberculosis. From these bodies tubercle bacilli can be grown. Experimental tuberculosis has been produced in animals from these bodies by me. From lack of sufficient facilities as well as time, the experimental data are insufficient, in comparison to the wide range of clinical material and, as the problem is for a research laboratory, it is merely mentioned as being in part corroborative.

The illustration offered comes from a sputum rather than a milk sediment, as showing not only these bodies but the varying forms of tubercle bacilli that are seen in the human, as well as may be grown in the laboratory from the same bodies in milks. In milks and in meningeal fluids there may be found also purely acid fast forms of the bodies. In milk sediments we find either these bodies alone or tubercle bacilli alone as has been shown in the larger proportion of cases apparently dependent on whether the lesion is glandular and lung, as contrasted with udder tuberculosis.

Beyond the point of diagnosis, there is a very important point that pasteurization of milks, experimentally inoculated with these bodies,

for one-half hour at 145°, has repeatedly failed to render the milks sterile.

In sum then, milk sediment smears by the Stewart method gives, besides the quick diagnosis of the bacterial content and that of garget, other conditions that are important. While of less importance, contamination of milk by extra-mammary abscesses and the diagnosis of cows out of condition, or milked too soon after parturition, are also essential in the production of clean milk. There is little need to show the importance of the possible diagnosis of animal tuberculosis. Until municipalities can have their supplies examined by cytodiagnostics there is one way to compel the appreciation of the certainty of the method by those who have attempted to use it and have found it unsatisfactory. From an exhaustive pathological and histological study of cows' udders, the British Veterinarian Association have put themselves on record that pus cells are pathological. If now the dairy colleges in this country will carry out the following experiments, order may be produced. All stages of garget should be studied for the appreciation of polymorphonuclears of acute garget and the eosinophilic and endothelial cells of subacute and chronic forms, as well as for the streptococcus. Dilutions of such milks should then be made in clarified milk (it is quite significant that clarification is the commercial process based on the laboratory use of the Stewart method of examination). Only one who has repeatedly diagnosed garget by a few clumped pus cells with the streptococcus can realize how tremendous must be the dilution sufficient to exclude the laboratory finding. Such experiments should then be extended to known tuberculous udder gland, and lung lesions; clean milk should be contaminated with the exudate from abscesses. There would be, as I have certain knowledge from having taught many who have little knowledge of cytology, little hesitancy in recognizing and differentiating squamous epithelium from endothelial and pus cells. All attempts to find pathological lesions in cows from having counted millions of desquamative cells in the sediment would be corrected. Further, should these varied experiments be followed by pasteurizing such milks and then contrasting the original stained smear with the latter, an appreciation of how vital staining is affected by heat would be forthcoming. The latter applies equally to cells and bacteria.

To reiterate, centrifugal smears stained by a good differential stain, like Hastings, as well as for tubercle bacilli, have a place of no less importance in milk work than similar methods in internal medicine; bacterial counts are a waste of good media and time, although they are measured by the cheapest help of the laboratory. So valuable are the results of milk sediment smears that two years ago before the State Charities Association I stated that the adequate control of milk could simply, reasonably, and accurately be

obtained by medical inspection of the humans (in connection with the control of communicable diseases by constant carrier search), by veterinarian examination of cows and, finally, by the aid of the laboratory smear examination. The latter would check up the medical inspection of technic and would not only confirm possible or known herd conditions, but would, as I have shown, frequently give the veterinary warnings ahead of physical examination. With reciprocity of cities, counties and state the entire field could be covered without duplication. The interdependence of communicable diseases and milk in terms of adequate control is widely advertised by milk trusts in terms of pasteurization. The scientific conception of the problem has been started in isolated spots in terms of typhoid carriers. With the accumulating evidence of the irresponsibility of the bacterial counts, is it not an opportune time for dairy colleges to take up milk examination, as internists take up normal or abnormal human fluids? Clean, raw milk should be more than a possibility. I have recently called attention to what may be a not unimportant problem. While a neighboring city was calling attention to frequent epidemics of typhoid and a present one of scarlet fever due to milk, I was for a second year being impressed with the fact that, for several days at a time and for the majority of reported cases for a week, that whether the few cases were diphtheria or scarlet fever, they were all taking a milk which was pasteurized in the bottle. Because of my knowledge that the majority of the constituent parts of this milk was two and three days old at the time of delivery, because these producers giving the old milk were repeatedly and almost constantly dirty and infecied milks, I felt most impressed with the possibility that infection could take place more easily with lowered resistance from old milk as readily as from other forms of old food. It is not because of sediment smear examinations that this city has had no epidemics of communicable diseases, however small, in the past eight or more years. When we can control all individuals and their families who have to do with the production and distribution of milk and correlate with this, the rational method of examining milk, we shall have solved most if not all the present-day problems of milk.

Milk sediment smear examination is an integral part in the production of clean, safe milk.

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FACTORS DETERMINING MORTALITY IN PROSTATECTOMY.

BY IRVING SIMONS, B.S., M.D., Nashville, Tenn.

A discussion of primary mortality after prostatectomy requires no apology, as the mortality of this operation is still so great throughout this country as to work a hardship on patient, family practitioner, and surgeon. In addition to this the surgeon of the present day is laboring under the disadvantage of the public's knowledge of the mortality of the previous decade. Consequently, it is not uncommon to find practitioners who are very loath to refer patients for operation until they are forced into it by the patient, who is by this time a poor surgical risk, because such practitioners remember few in the past who survived the operation, and of these but few who were in good health after it.

The primary mortality of prostatectomy in the hands of the general surgeon, according to B. A. Thomas, based on the reports of twenty-six representative general hospitals in Pennsylvania and neighboring states, was 22.5 percent.¹ It is not primarily the purpose of this paper to invite comparison between the mortality figures of prostatectomy in the hands of the general surgeon and in those of the specialist, but it is a rather striking thing to compare the above figures, which are possibly even a little better than the figures that represent results in this region, with those that represent the results obtained by some of the representative urologists here and abroad.

PRIMARY MORTALITY OF PROSTATECTOMY.²

Suprapubic method²—

Walker, 112 cases.....	5.0 percent
Freyer, 1000 cases (first 100 cases, 10 percent; last 100 cases 3 percent)	5.5 percent

Perineal method²—

Young, 450 cases.....	3.7 percent
Watson	6.2 percent
Proust	5.8 percent
Legueu (1026 collected cases).....	8.0 percent

Both methods³—

Judd.	5.3 percent
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In attempting to find the cause of such marked differences, let

¹Thomas, B. A.: The Significance of Specialism with Reference Especially to Genitourinary Surgery (Jour. Penn. State Med. Assn., Nov., 1916, XX, p. 101.

²Walker, Thomson: Genitourinary Surgery.

³Judd, E. S.: Collected Papers of the Mayo Clinic.

us inspect the problem with which we are dealing, and the answer may be forthcoming. The causes of death after prostatectomy may be grouped thus:

- I. Causes apparently unavoidable.
 - Pulmonary embolism.
 - Cerebral thrombosis or embolism.
- II. Causes partly avoidable by preoperative study of and preoperative preparation of the patient.
 - Renal insufficiency (uremia?).
 - Urosepsis (urotoxemia?).
- III. Causes partly avoidable by operative skill and methods.
 - Shock.
 - Hemorrhage.
 - Pneumonia.

It must be admitted that the causes of death enumerated in Group I are unavoidable, and their incidence, bases on statistical experience, is by no means high. Being unavoidable, their occurrence cannot account for the marked differences of mortality percentages between the two groups of operators mentioned at the beginning of this article. To be sure, a number of cases of cerebral embolism, following valvular diseases of the heart, could be avoided by refusing to operate on such risks, but unfortunately nearly all prostatics are more or less bad risks, and so badly need the relief that operation affords that this can hardly be done. Again, one might as well refuse to operate on cases with hypertension, and so avoid the possibility of hemiplegia, another complication causing unavoidable mortality. Such an attitude is, of course, not feasible, and we must take the risk, and consider the mortality due to this class of complications as unavoidable.

Passing on to Group II, we now face the problem of renal insufficiency and sepsis, as causes of postoperative death, and the reasons for classifying them as partly avoidable by preoperative study and preparation of the patient. The clinical picture of the prostatic is none too alluring; he is, as a rule, a man of advanced age, with more or less arteriosclerosis, consequent hypertension, and a small blood volume; he has more or less chronic diffuse nephritis and, as a rule, albuminuria and infected urine of low specific gravity; he may have oliguria, due to his restriction of fluid intake.

Aside from the primary symptoms of prostatic hypertrophy (dysuria, more or less hematuria, painful urination, and nocturia), he is, as a rule, suffering from a group of symptoms of far more importance to the surgeon; they are the symptoms secondary to obstruction at the vesical neck. These secondary symptoms are dyspepsia, loss of appetite, of flesh, of strength, of sleep. This group of symptoms is due partly to the nocturnal polyuria and

frequency, partly to the absorption of noxious products formed by the putrefaction of residual urine in the bladder, and partly to the back-pressure up the ureters on the kidneys, with a lack of elimination of normal urinary products, and a resultant retention of nitrogenous bodies (uric acid, urea, creatinine, etc.) in the blood.

Having described the average case that reaches the surgeon's hands, let us add to this the complication of acute retention of urine, and also fever due either to instrumentation of an infected urethra and bladder, or even to an infected hydronephrosis of pyelonephritis, with or without abscesses in the renal parenchyma.

How are such elements of risk to be even partly avoided by pre-operative study and preparation? After a preliminary physical examination there are several important points in urinalysis; twenty-four hour specimens of urine are collected, the patient being on a normal full diet, and are examined for specific gravity and the quantity of urea. As a rule, the gravity is fairly good (1012 to 1020), and this should be recorded for future reference; the amount of urea may be found to be as low as 15 to 20 grams per day without causing alarm. A phenolsulphonaphthalein test should be made by giving 0.006 grams of the dye intravenously, and, a note being made of the time of its first appearance, two separate hourly specimens are then collected *by catheterization* (on account of the residual urine). A delay in the appearance of the dye beyond 10 to 15 minutes is not a favorable feature. Also, patients who eliminate less than 30 percent of the dye in two hours had better be observed until a higher figure (40 to 50 percent) is reached. Other functional tests on the urine, such as indigocarmine, phloridzin, etc., are of service, and are preferred by others, they reporting equally good results. As a rule, I prefer one urine function test, and lay more stress on phenolsulphonaphthalein than on the amount of urea in the urine.

Blood chemistry is of great service, and operation in the presence of a high nitrogen retention in the blood should be looked on with some concern, and, if possible, avoided or at least postponed, even though the patient may be apparently a good surgical risk on clinical or other grounds.

The value of cystoscopy cannot be underestimated. In prostatics it is of value, not so much for the purpose of obtaining the function of each kidney separately, but to decide on certain points in prognosis, and to help in the selection of the type of operative procedure, the necessary duration of general anesthesia, etc., in the particular case in question. A moderate sized cystoscope (No. 19 Charrière) can be passed in quite a large percentage of cases of prostatic hypertrophy. However, if there is difficulty, it should be desisted from, as trauma may induce epididymitis or even marked sepsis (bacteremia). Where the ureteral orifices cannot be catheterized

owing to their position, one must be content with meatoscopy with indigocarmine, which gives a satisfactory estimate of the function of the kidneys. One can at times observe a flow of pus from one or both kidneys, which, of course, makes the prognosis more grave. It is, of course, more desirable to obtain separately catheterized specimens from each kidney, and to subject these to culture and examination with the aid of some functional test (preferably phenol-sulphonephthalein administered intravenously). However, if the phenolsulphonephthalein test on the bladder urine, as described before, is satisfactory, there is little to be gained by this. The main thing to be learned is whether there is pyogenic infection of one or both kidneys. Should this be found, pelvic lavage should be carried out until sterilization is accomplished, and, should the attainment of this be delayed inordinately, a pyelogram may show an infected hydronephrosis or a pyonephrosis, which is an excellent basis for postoperative renal insufficiency and sepsis, as autopsies on such cases have shown.⁴

By cystoscopy only can we come to a diagnosis of various complicating factors, such as vesical stone, diverticulated bladder, diverticulum of the bladder, papilloma of the bladder, carcinoma of the prostate infiltrating the bladder mucosa, etc. If these do not contraindicate prostatectomy, they either put the operator on his guard during the operation, or prevent the use of the simple operative technic to be described, which technic is adequate in the average case, and means a short operation and little or no general anesthesia. Another and perhaps the most important function of cystoscopy is to learn whether there is merely a median lobe or a general hypertrophy. Naturally enucleation of the former is a much simpler procedure.

THE REDUCTION OF MORTALITY FACTORS IN GROUP II.

Having arrived at a conception of the case from a thorough study of it, we are now confronted with a question about which there is still considerable discussion—namely, the question of one-stage and two-stage prostatectomy. Although it is true that some of the best urologists are using two-stage prostatectomy to the exclusion of the one-stage operation, yet most of them select their cases, reserving the worst risks for the two-stage operation. The matter simply resolves itself into the question, What are the advantages and disadvantages of the two-stage operation, inasmuch as the one-stage operation is naturally more desirable if it can be used without jeopardizing the patient?

It has seemed advisable to most operators to select some cases at least for the one-stage operation without preparation. Such a case is one with a clean, uninfected bladder; with clear urine, of good amount and gravity; with little residual urine; and with a good

⁴Simons, I.: Lavage of the Renal Pelvis, etc. (Trans. Amer. Urol. Assn., 1917).

or fairly good phenolsulphonephthalein output (40 to 60 percent in two hours).

The object of the two-stage operation is to allow the patient to become accustomed to the relief of the renal back-pressure, and to give the bladder a chance to become or be rendered less infected. In other words, the object of it is to diminish the chances of renal insufficiency and sepsis, conditions classified above as partly avoidable by preoperative preparation. All surgeons who have done prostatectomy by the two-stage method will remember cases in which fatal renal insufficiency ensued after only the first stage was done, and that stage under local anesthesia. Also, although such an outcome occurred for the most part in cases in which there was complete retention of urine, yet not all cases had this complication.

The question, therefore, resolves itself into this, What are we to do with the cases that are bad risks? Are we to do them in two stages as routine? It has always seemed to me that this class of cases can be done in one stage *with preparation*, provided that the preparation is thorough, and that this method is as safe as the two-stage method and has advantages over it. I refer to cases that have infected bladders with a great deal of residual urine, some polyuria, possibly a low phenolsulphonephthalein output, (20 to 40 percent or even less), and retention of nitrogenous bodies in the blood, but in which the urethra will allow the passage of a soft rubber catheter, although at times this must be stiletted; such a urethra will allow of retention-catheterization. In these cases the preparation is somewhat as follows: The patient is allowed to be ambulant, but in the hospital. He is kept on a regular full diet, as it is inadvisable to suddenly change his mode of living. He is put on forced fluids and urotropin, with the addition of sodium benzoate and boric acid if there is alkaline cystitis. His phenolsulphonephthalein output is estimated on his admission to the hospital. He is now put on catheterization and bladder lavage for a few days to a week, the phenolsulphonephthalein output being estimated every couple of days. Rises of temperature after catheterization should be disregarded, as they will usually diminish or cease after the first few times. A permanent catheter is now inserted, and plugged with a cork, so that the patient can empty the bladder every few hours; during this period of permanent catheterization the bladder should be washed and the patient watched for clinical signs of renal insufficiency, and, if these should ensue, the catheter should be removed and the preparation resumed later. Also, the specific gravity of the twenty-four hour urine, the total amount of urea, the phenolsulphonephthalein and excretion, and the blood pressure should be noted, and, if any of these, particularly the last three, fall markedly, operation should be postponed until they reach a higher point. The object of these procedures is to obtain

a toilet of the bladder and a relief of the vesical and renal pressure without cystotomy. An advantage is that we can gradually release the vesical tension and thus reaccustom the kidneys to this normal condition, and, if the patient does badly, we can retrace our steps, which cannot be done after cystotomy. Also, the phenolsulphonephthalein and urea outputs can be followed more easily and more accurately than can be done after cystotomy.

In certain cases where there is complete retention and catheterization is impossible even with a stiletted rubber catheter,⁵ it may be advisable to confine the patient to bed, to make a tiny suprapubic incision, and, inserting a large trocar (26 to 30 French) into the bladder, put a catheter through this, and, removing the trocar, continue the above technic by means of the suprapubic catheter. Personally, it seems better to avoid an open preliminary cystotomy, if it can be avoided, for reasons that have been dwelt on.

A suitable day for operation is now selected, based on the features above outlined. The chief things that should delay the day of operation are a poor general condition of the patient and a falling blood pressure, urea, and phenolsulphonephthalein excretion on the institution of the measures of preparation. It is always inadvisable to operate in the presence of an acute epididymo-orchitis, which may be present on admission, or may ensue during the course of the preparatory treatment. The presence of high nitrogen retention in the blood is also undesirable.

SUMMARY OF MEASURES DIRECTED TOWARD THE AVOIDANCE OF RENAL INSUFFICIENCY AND SEPSIS.

1. Few, if any, and perhaps no prostatectomies are urgent.
2. The secondary symptoms of prostatic obstruction should be relieved, if possible, before the patient reaches the operating table. This is really a preparation of the kidney for the sudden (operative) relief of back-pressure to which it has become more or less accustomed.
3. The infected bladder should be cleansed as far as possible.
4. Delay in operation is always advisable in the presence of complications or of fever that cannot be explained, as this may be due to pyogenic infection of the kidney.
5. The one-stage operation with preparation is preferred in most cases where the two-stage operation is usually said to be indicated.

⁵These will be found to be rather few in number. In most of the cases in which the neck of the bladder cannot be passed with a stiletted rubber catheter, one can pass a moderately large (18 French) metal catheter. In such cases it is often possible, even at the risk of slight trauma, to pass a No. 24 Swinburne posterior urethroscope and through this to insert a No. 12 soft rubber catheter, which can then be left as a retention catheter in the bladder, the urethroscope having been drawn out carefully over it, in the same manner in which one ordinarily withdraws a cystoscope sheath in order to leave the ureteral catheters in the ureters.

DIMINUTION OF OPERATIVE AND POSTOPERATIVE SHOCK, ETC.

The second problem is that of the diminution of operative and postoperative shock, hemorrhage, and pneumonia. These are to be considered as partly avoidable by operative skill and operative methods.

In a case in which preparation is unnecessary, or in which preparation has been made according to the above outline, the operation should be performed as follows:

Suprapubic cystotomy should be done under local anesthesia (preferably with novocain), the bladder having been filled with solution and the catheter left in place. A high incision is preferable to a low one, as it avoids the Retzius space as much as possible, and in this way diminishes the amount of wound suppuration. The only danger in the high incision is that the peritoneum may be opened, but this can be avoided by care and skill, and, if it should occur, the opening can be closed immediately. An opening is now made into the bladder large enough to admit the index finger, the prostatic region is gently explored, and the contour of the prostate, stones, etc., noted. If the gland is very large, the vesical incision can be enlarged. The catheter is then released and most of the fluid drained off. This entire procedure of cystotomy should be done slowly, using fifteen to twenty-five minutes, and gaining the patient's confidence while it is being done. Providing that the abdominal wall is not too thick, it should be quite painless.

In ordinary circumstances the enucleation of the gland should then be proceeded with. This is preferably done in the conventional manner, with a gloveless right hand, the index and middle fingers of the gloved left hand being inserted into the rectum. It is during this stage that one cannot too strongly insist on as light an anesthesia as is compatible with the conditions to be met with, for example, nitrous oxide and oxygen. In some cases a few whiffs of ether must be employed in addition, but the elimination of ether depends usually on the skill of the anesthetist in handling gas. Ether anesthesia should and can be omitted, if the skill of the operator requires, from a few to possibly ten minutes for the enucleation. If the entire gland (with the exception, of course, of the compressed posterior lobe) is thoroughly enucleated, the hemorrhage will be slight, and, after a hot irrigation, will practically cease, as the prostatic capsule will contract even better due to the awakening of the patient on the table, a thing to be desired. A very soft rubber tube, 1 inch in diameter, is now inserted nearly to the bottom of the bladder and sutured in place, the bladder being closed snugly around it, and the patient is taken off the table.

Where gas anesthesia is not available, I prefer the use of spinal anesthesia, and think it less dangerous than deep narcosis with ether, as is usually given. For this purpose I have successfully used

30 minims of 1 percent novocain without harm. One of the disadvantages of this, however, is that it does not regularly produce complete analgesia.

SUMMARY OF MEASURES DIRECTED TOWARD THE AVOIDANCE OF SHOCK,
HEMORRHAGE, AND PNEUMONIA.

1. The cystotomy should be done under local anesthesia, preferably with a rather high incision.
2. Speed during the cystotomy is not only unnecessary, but undesirable.
3. The enucleation of the gland should be done under gas and oxygen; narcosis with ether should be avoided; spinal anesthesia is less dangerous than that with ether.
4. In enucleation of the gland, both speed and skill are very desirable, and materially diminish mortality.

THE IMPORTANCE OF AFTER-TREATMENT IN THE REDUCTION OF MORTALITY.

In no operation in surgery is the after-treatment so important and so laborious. Neglect of this means material increase in mortality statistics, and is no doubt responsible for some of the mortality in the hands of some surgeons.

Immediately after operation the patient should be laid supine, and the foot of the bed elevated with shock-blocks. Not much stimulation is needed as a rule. Aspirin should be preferred to morphine for postoperative pain, the latter being avoided as far as possible. The tube should be connected to a drainage bottle as soon as the patient can be conveniently raised to a slightly sitting posture (usually in six to eight hours). If possible, one of the mechanical beds so common in hospitals should be used in all cases. The drainage bottle should be watched for excessive hemorrhage; usually the hemorrhage stops soon, but, if necessary the bladder may be irrigated with a warm solution of compound alum powder (Squibbs) 1 dram to the pint or even stronger. Only in case of extreme necessity should the tube be removed and the bladder packed for hemorrhage.

The patient should be induced to take fluids by mouth almost immediately after operation. A rectal drip should be also begun early, using a soft rubber catheter in the rectum. Subsequently the patient should be put on full diet, if possible, even as early as twenty-four hours after operation.

About the fourth day, or as soon as urine begins to leak around the tube, a small tube should be substituted, and this soon removed, between the fourth and the seventh day, when a soft rubber catheter should be permanently inserted into the urethra. The dangers of inserting a soft retention catheter into the urethra a few days after

operation have been grossly exaggerated and have led to the use of complicated suprapubic suction apparatuses, which can be practically dispensed with in most cases. The wound is then strapped. The rapid removal of the drainage tube lessens the chances of formation of an indurated sinus. With this form of management, urinary leakage from the wound should cease in ten to fourteen days, and at that time the retention catheter should be removed and the patient induced to void. If this is difficult, or if leakage recurs above, the catheter should be reinserted and the procedure repeated later. The patient has in the meantime been allowed to sit in a chair (between the tenth and the fourteenth day), and the wound should be healed in three to four weeks, although sinuses may persist longer. Persistence of suprapubic leakage may be due to some slight obstruction below, but is more often due to the formation of a more or less indurated sinus, the tube having been left in the bladder unnecessarily long. This is more apt to occur in cases that have operated on in two stages, as the week or more that elapses between the first and the second stage predisposes to induration, another plea for the modified one-stage operation.

SUMMARY OF AFTER-TREATMENT.

1. Avoidance of supine position as soon as possible on account of the danger of hypostatic congestion of the lungs and pneumonia in the aged.

2. Rapid resumption of full diet.

3. Rapid removal of drainage in order to prevent an indurated suprapubic sinus.

4. Assumption of drainage through the urethra by the early insertion of a retention urethral catheter.

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WAR INJURIES OF THE BLOOD VESSELS.*

By DANIEL N. EISENDRATH, A.B., M.D., Chicago.

I desire to present to you today a case which is of great interest in relation to a class of injuries which constitute a relatively large percentage of those sustained during the present war. The patient is a man 56 years of age, who was admitted to my service complaining of an ulcer situated about the middle of the anterior aspect of the right leg and due, in his opinion, to a condition of varicose enlargement of the veins of the leg. No unusual features of the case were suspected until during an examination of the limb in order to determine the extent of the enlargement of the veins. A considerable increase in size of the upper half of the right thigh was noted as compared with that of the left thigh. Further investigation revealed the presence of an arteriovenous aneurism of the femoral artery and vein in the upper third of the right thigh. When questioned as to the possible etiology of the aneurism, the patient stated that he had been shot eighteen months before, a 38 calibre bullet fired from a revolver having entered the inner aspect of the right thigh and emerged at a corresponding point on the outer aspects. The wounds had healed uneventfully and he had paid no further attention to the injury, and did not even consider it of sufficient importance to mention it as being related in any way to the varicose veins and ulcer for which he entered the hospital. He stated that he was confined to his bed for several weeks, after sustaining the injury, on account of an extensive swelling of the thigh, but that he had resumed his work shortly thereafter and was only recently obliged to abandon the same on account of the varicose ulcer.

Examination of the patient shows a marked varicosity of the veins draining into the internal saphenous from the middle third of the thigh almost to the ankle. The right limb in general is larger in circumference than the left. There is a well marked ulcer which does not present any characteristics differing from those of varicose ulcer in general, situated at about the middle of the right leg. In the upper half of the right thigh, along its inner aspect, there is a sudden enlargement in the size of the thigh and over this area a distinct pulsation is visible. Upon palpation, one notes a peculiar thrill, which extends from Poupart's ligament to about the lower third of the thigh. It evidently has its origin close

*A lecture delivered at clinics held at Cook County Hospital January 11 and April 10, 1918, for the Medical Officers Reserve Corps Class in Military Surgery.

to the surface, and this accounts for the distinctness of the thrill. The latter can be followed, on palpation, as high up as the iliac vessels and, in a downward direction, to the lower third of the femoral vessels. There is no distinct expansile pulsation such as one would expect in an aneurism due to disease. Auscultation confirms the diagnosis of an arteriovenous aneurism by the loudness of the bruit, which is heard during the systole and diastole. The bruit is highest and loudest over the center of the swelling, the tones gradually softening and disappearing in an upward and downward direction as the stethoscope is moved along the vessels.

Whether we are dealing in this case with an aneurismal varix or a varicose aneurism is impossible to state with any degree of certainty. The patient will not consent to operation at the present time, although the direct relation between the varicose veins and ulcer, for which he has consulted us, and the aneurism has been explained to him. We have told him that the ulcer and accompanying varicose veins are due to an excess of blood in the femoral vein and its branches, with resultant stagnation, as the direct consequence of the communication between the femoral artery and the vein.

That we are not dealing with an arterial aneurism is evident by the peculiar thrill and the loud machinery-like bruit, which is propagated in both an upward and downward direction along the veins. In an arterial aneurism the murmurs are intermittent and heard only during the cardiac systole. Again the presence of the disturbance in the venous circulation for which he consulted us is confirmatory of arteriovenous aneurism.

History of Operation Performed April 10, 1918.—We will make an incision in a vertical direction from Poupart's ligament to a point corresponding to the position of the middle and lower third of the thigh. The aneurism is situated so close to the upper third of the thigh that it will be impossible for us to apply an elastic constrictor above the point of operation. I will therefore first expose the femoral artery and vein close to the point where the external iliac vessels become the femoral vessels. Having now exposed the vessels, we will apply catgut traction ligatures around them, in order to be able to control the circulation through the vessels by simple traction upon the ligatures, without actually tying the vessels, a method which is of considerable value where one must have control of the circulation of any region in the body and be able to ligate a vessel if it is considered necessary.

We will next expose the femoral vessels below the point of aneurism and apply the same method of traction control of circulation at this point. Exposure of the aneurismal area shows that the femoral artery and vein are anastomosed at one point, and that we are dealing with a true arteriovenous aneurism of the aneur-

ismal varix type. The artery walls are very much thinner than normal, and the artery itself presents an irregular tortuous outline. The vein walls are also much thinner than normal, and the vein itself is considerably dilated at the point of anastomosis.

The ideal method of treating such a case would be to make an incision through the area of communication between the artery and vein and then to suture separately the orifices of communication respectively of each vessel. An effort to perform the operation in this manner, in spite of control of the main trunk vessels above and below the aneurism, has resulted in such a profuse hemorrhage that we are compelled to abandon this ideal method of operative procedure, and will proceed to ligate the femoral artery and vein about one inch above and the same distance below the aneurism. Even this method fails to check the bleeding on account of the abundant collateral circulation which has developed along the posterior aspect of the aneurismal varix. You will now see that it has been actually necessary to resect the aneurismal area and ligate a number of the orifices of communication of the collateral vessels to the sac before control of the bleeding has been secured. It is now only necessary to suture the wound in the soft parts, but we feel confident that there is sufficient collateral circulation in spite of the resection of the aneurismal area, because during the eighteen months since the injury was sustained an abundant collateral circulation must have been established.

Postoperative Notes.—The patient made an uneventful recovery. The limb was elevated and kept well wrapped up in cotton for two weeks following the operation. The wound healed by first intention with no evidences of gangrene developing, showing that our prognosis in regard to the collateral circulation has been well founded.

In connection with this case I propose to discuss injuries of the blood-vessels as encountered during the present and Balkan wars. I have reviewed a large number—almost one hundred—articles published since the close of the Balkan wars, and also the classical monograph of Matas.¹ I have attempted to select the salient points of the publications by surgeons of both sides during the present war, and will attempt to give you a brief review of the same.

The number of wounds of the blood vessels during the present war has been far greater than that of all previous wars of which we have a record. During the Franco-German war of 1870-71 only forty-four aneurisms were reported on the German side. During the Russo-Japanese war eighty-eight were reported, while on the Serbian side alone during the Balkan wars of 1912, Soudbotitch² was able to collect 105 aneurisms. As early as September, 1915,

¹Keen's Surgery, V.

²Trans. Int. Cong. Med., 1913, VII.

Zahradnický³ tabulated 348 aneurisms reported by the surgeons of the armies of the Central Powers. Since this contribution a large number of cases have been reported by Makins, Bier, von Eiselsberg, Swan, and many others. This striking increase in the number of blood-vessel injuries is due to the difference in the character of weapons and missiles employed during the present and the Balkan wars, as compared to those used in all previous wars. In the latter campaigns the majority of these injuries were due to penetrating, e. g., stab wounds. The large number of blood-vessel injuries during the present war is due to the use of metal covered bullets and of explosive shells and bombs. Kuettner believes that the shell fragments cut the vessels like a knife and cause external bleeding, while aneurisms occur more frequently with the steel jacketed bullets.

Blood vessel injuries can be best divided into: (1) contusions, (2) penetrating injuries, (3) dry wounds, (4) arterial or arterio-venous aneurisms.

1. *Contusions*.—That a contusion alone of an artery or vein does occur can no longer be doubted. A localized or diffuse thrombosis may take place even when the wall is only contused and may result in gangrene, secondary hemorrhage, or embolism. Thrombosis from contusion is more commonly observed in veins than in arteries and less trauma is necessary to produce it.

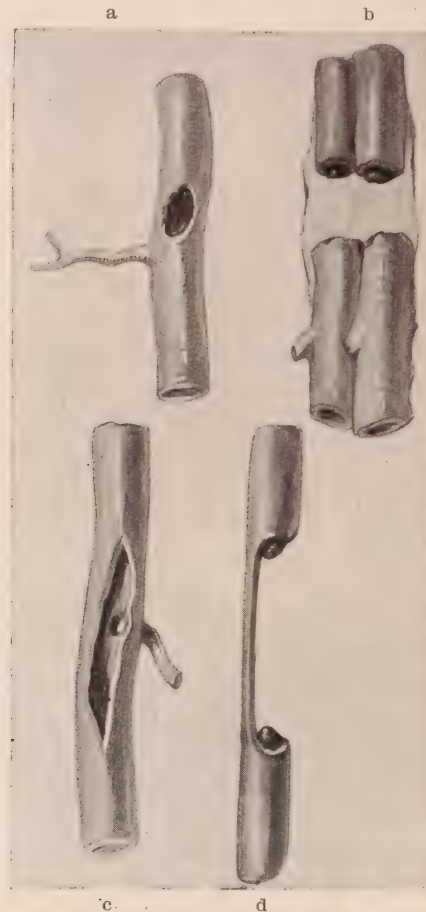
2. *Penetrating Injuries*.—The more or less complete severing of an artery is more frequent today than a perforation involving both sides of the lumen. Such a through and through injury occurs oftener in veins (Fig. 2) than in arteries. In the latter a frequent form of injury is a lateral puncture of the vessel wall, because wounds produced by fragments of shells and bombs more nearly resemble incised wounds, frequently being merely minute punctures. Simultaneous occurrence of an injury to a blood vessel and of a fracture is a serious combination, because the opening in the vessel may be tamponned by the bone fragment and hemorrhage occur during transport, owing to loosening of the fragment. Similarly a thrombosis of the perforation may occur at the time of injury and secondary hemorrhage occur as the result of the dislodgement of such a plug in the vessel wall. Sencert⁴ says that, in the case of a wound of one of the large vessels, the life of the patient depends upon the extent of the cutaneous lesion. If this is large, death occurs as a rule; if it is small, the blood may escape into a neighboring splanchnic cavity or it may fill the surrounding tissues. In a certain number of cases the hemorrhage is insignificant and there is spontaneous hemostasis. This is more frequently observed in cases of complete section of the vessel than in

³Wien. klin. Wehnschr., 1915, XXVII, p. 999.

⁴Lyon chir., 1917, XIV, p. 640.

lateral wounds and also in cases where the vessel has been subjected to contusions and ruptures of its interior coat.

3. *Dry Wounds of Vessels*.—Some very important articles about so-called “dry wounds” of vessels have recently appeared in the French literature. Fiolle⁵ reports that these “dry wounds” occur oftener than is generally supposed. It is possible that the heat



Courtesy of Surgery, Gynecology and Obstetrics.

Fig. 1.—Types of arterial wounds (Makins). (a) Oval wound of femoral artery close to a lateral branch. (b) Complete division of both artery and vein; note thrombosis of both vessels. (c) Unusually long lateral wound of axillary artery; note the branch arising immediately opposite the center of the wound. (d) A three-fifths division of the femoral artery; this form is frequent and amounts practically to a three-fifths division of the femoral artery, but spontaneous thrombosis is less likely to occur than when vessel is completely severed.

of the projectiles is an important factor in causing spontaneous hemostasis. Complete section of an artery occurs in these “dry” cases more often than lateral wounds. The piece of projectile may act as a tampon and stop hemorrhage or the end of the vessel be

⁵Rev. de chir., 1916, LI, p. 444.

closed by a thrombotic plug. Sometimes a "dry" wound is found with no mechanism to explain it. Such "dry" wounds are a frequent source of secondary hemorrhage. Perrenot⁶ reports four cases, in all of which a clot strong enough to prevent the escape of blood from the completely severed vessel, was found. He believes that these dry wounds occur oftener when the projectile is a piece of shell than a bullet. The latter makes a clean wound with considerable hemorrhage and the development of a hematoma, while



Courtesy of Surgery, Gynecology and Obstetrics.

Fig. 2.—Wounded popliteal artery and vein, followed by gangrene of the leg (Makins). The wound in the artery involves nearly half its caliber and gaps widely, resembling a hole in a flute; the margins of the opening are comparatively smooth. A characteristic traversing perforation of the vein is shown, the shape of the openings being irregularly circular, and less symmetrical than similar wounds produced in the artery. The extravasated blood from these wounds had clotted firmly en masse; no murmur was audible in the swelling formed by the clot. Gangrene of the leg and foot was definite on the fourth day.

shell injuries give rise to contused wounds in which a large injured vessel may be incorporated in the lacerated tissue and, even if the vessel be completely divided, its coats are strongly compressed against each other by one of the surfaces of the projectile.

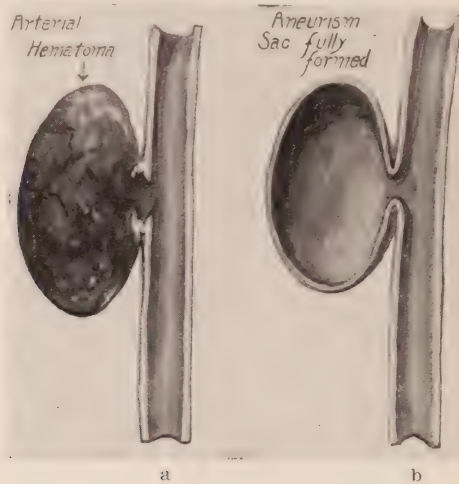
The frequent occurrence of these "dry" wounds, without immediate hemorrhage but with tardy bleeding, (eight days in a case

⁶Rev. de chir., 1917, LII, p. 232.

of Planson's) shows the necessity of a thorough systematic exploration of the vessels of a region, when the site and direction of the wound excite suspicion as to the nature of the lesion. Hours to weeks may elapse between the time of injury and the hemorrhage.

4. *Arterial and Arteriovenous Aneurisms.*—*Arterial Aneurisms.*—These may follow contusions of the vessel wall as well as penetrating wounds. The first effect of a contusion is to cause the wall to become thinner, then a thrombus forms. The seat of injury gradually yields and an aneurismal sac forms.

In general the term aneurism should only be applied when there is a well formed sac, and not to the first stage in which only an arterial hematoma is found. The evolution (Fig. 3) of an arterial aneurism is usually as follows: At the time of injury there is a



Courtesy of Surgery, Gynecology and Obstetrics.

Fig. 3.—Stages in the evolution of an arterial hematoma following gunshot wound of an artery, or of both vein and artery, to form a traumatic aneurism. (a) A large hematoma lateral to the vessel communicates with lumen through a wound in wall of artery; note ragged character of arterial wound in early stage. (b) Aneurism fully formed; note smooth character of interior of sac and the rounding off of the edges of wound in artery.

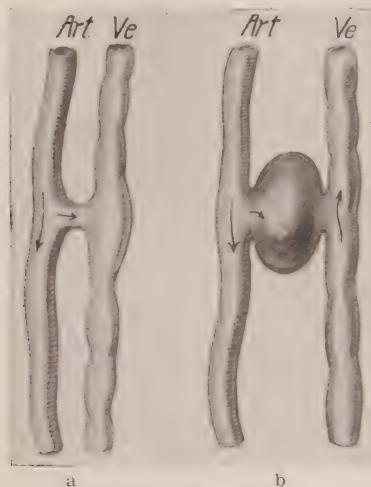
considerable primary spurt of blood, but this ceases spontaneously except in the case of the largest vessels of the trunk. Aside from this external hemorrhage the most common sequel of an arterial wound is the formation of a hematoma (Fig. 3) whose size depends upon the resistance of the tissues. If the clot becomes firm there may be danger of gangrene from pressure on the collateral vessels. The hematoma usually becomes encapsulated within two to three weeks by a sac formed from the connective tissue of the immediately adjacent structures. This sac is lined by endothelium and the ragged edges of the wound in the arterial wall become smooth.

Graf⁷ found that only a minority of his 43 cases encapsulated

⁷Beitr. z. klin. Chir., 1916, XCVIII, p. 523.

to form aneurisms. The majority began to bleed from the second week on. The opinion of Graf is not shared by any other writer, the majority believing that, if the patient does not die from the primary hemorrhage, an aneurism will form or gangrene occur.

Arteriovenous Aneurisms.—(Fig. 4). The conclusion to be drawn from a study of the statistics of various writers is that arteriovenous aneurisms have been found more frequently during the present war than those of the pure arterial type, especially in the larger vessels. Bier⁸ in 102 war aneurisms, found that 45 were arterial and 56 of the arteriovenous variety. In one case a single bullet had caused three aneurisms, one on the subclavian and the innominate arteries respectively, and an arteriovenous of the sub-



Courtesy of Surgery, Gynecology and Obstetrics.

Fig. 4.—Diagrams of arteriovenous aneurisms (Matas). (a) Direct communication of the artery (art) and vein (ve); aneurismal varix. (b) Intermediary sac between the artery (art) and vein (ve); varicose aneurism.

clavian artery and vein. Makins⁹ has observed a similar case. R. J. H. Swan found that in 146 recently published cases, 106 were arterial aneurisms and 40 of the arteriovenous variety. In the larger vessels the proportion of arteriovenous to arterial aneurisms is greater than in the smaller vessels. Makins has found that arteriovenous aneurisms occur far less frequently than the pure arterial variety.

There are four chief forms of arteriovenous aneurisms, namely:

A. A pure perforation of the artery and vein (this is rare), the sac being either on the distal side of the artery or between the two vessels.

B. Complete division of both artery and vein, with the formation

⁸Beitr. z. klin. Chir., 1915, XCVI, p. 556.

⁹Brit. Jour. Surg., 1916, III, p. 353.

of a common cavity into which the four vessels open. This retains the form of a hematoma for some time but extends rapidly, and gangrene or secondary hemorrhage are not uncommon. Such cases are not numerous, and generally demand early surgical treatment, either on account of rapid extension, or the occurrence of one of the complications indicated.

C. In the great majority of cases the wound in the artery is lateral in character, associated either with a lateral wound, a double perforation or a complete division of the vein (Fig. 1).

D. The sac may sometimes depend mainly on the venous injury, the vein being widely opened or completely divided, while only a small opening persists in the artery. In such cases the wall of the sac is thin and ill developed.

The occurrence of a pure aneurismal varix (Fig. 4), i. e., a direct lateral anastomosis usually follows the passage of a missile between the artery and vein. Cases of varicose aneurism where a sac forms between the artery and vein are more common than those of direct anastomosis of the two vessels (aneurismal varix). The close proximity of the popliteal vessels, of the femoral vessels and, to a less extent, in the groin and of the vessels in the carotid sheath account for the greater frequency of aneurismal varices (Fig. 4) in these regions than elsewhere according to Matas.

The sac of a varicose aneurism scarcely even contains a clot, because the circulation is too active to permit of the formation of a clot. The interior of the sac, like that of an arterial aneurism, is lined by a smooth layer of endothelium which has formed by proliferation from the interior of both vessels.

The distant and remote effects of arteriovenous anastomosis will be marked in proportion to the importance of the vessels involved. It is important to bear in mind, however, that the aneurismal varices of the neck and upper extremities are especially well tolerated. In the lower extremities the effects of the overplus of blood and damming back of the venous circulation are more pronounced and cause varicose veins and ulcers as in the patient shown today.

COMPLICATIONS OF VESSEL INJURIES.

Makins found that the most common of these are symptoms dependent on the pressure of the effused blood and clot on the neighboring structures, the development of peripheral gangrene, the occurrence of secondary hemorrhage, the detachment of emboli from the thrombus, and, very rarely, the result of inflammation from secondary infection. These complications occur, usually, comparatively early before a definite false aneurism has formed.

Secondary hemorrhage may occur after two or three days or later—after about ten days. The earlier variety is the less important. The later form of secondary hemorrhage is vastly more dan-

gerous. It may show itself in two forms, either a rapid extension of the swelling in the limb, or as an external hemorrhage. It is rare for this form of hemorrhage to depend on septic infection of the aneurism itself. It rather appears to depend on a defective effort at localization, which allows some part of the limiting boundary of clot to give way, often as a result of infection of the surrounding tissues, or as a result of a rise in the general blood pressure accompanying increased activity, and, perhaps, from free movement of the limb on the part of the patient.

Secondary hemorrhage, especially in the "dry" wounds referred to previously, may be due to the detachment of the clot plugging the end of the vessel or, again, hemorrhage may occur from the elimination of a necrosed piece of tissue which opens a contused vessel.

EFFECTS OF BLOOD VESSEL INJURIES.

This question has been especially studied by Makins. He found the heart excited and apparently enlarged after wounds of the vessels, this being more marked when there was an arteriovenous communication than after a simple arterial wound. Quite pronounced cardiac murmurs are present for a short time but gradually disappear. They are due to the transmission of the aneurismal bruit to the heart, and are most frequently observed in carotid and femoral aneurisms but never in those of the arm.

In arteriovenous aneurisms there is always dilatation of the superficial veins, resulting in varicose enlargements and ulcers. Pain may be a very marked symptom if adjacent nerve trunks are compressed, or are later included in the cicatrices following absorption of the hematoma.

Gangrene may result from pressure upon the collateral circulation of the artery involved.

It is evident that, the greater the deviation of the bloodstream, the more marked will be the effects of venous obstruction and arterial ischemia. These local effects are manifested as varices, edema, followed by thickening and connective tissue hyperplasia. Sometimes an elephantastic condition develops as the result of resistant venous and lymphatic stasis. Dusky discoloration or cyanotic hue in the legs has occasionally been noticed.

SYMPTOMS AND DIAGNOSIS.

Signs of Arterial Aneurisms.

All observers agree that the murmur is louder and harsher in traumatic aneurisms than in those due to disease of the vessel wall. The murmur is also heard more widely in a distal than in a central direction in arterial aneurisms, while in the arteriovenous variety

the murmurs are conducted in both directions, i. e., towards the heart as well as distally. The systolic murmur in an arterial aneurism varies greatly in intensity, depth of tone and musical character according to Makins. It is loudest where the artery and sac communicate and, as the opening in the vessel wall becomes smoother and the aneurismal sac more perfectly formed, the murmur becomes softer and deeper. During the early stages (Fig. 3) of the formation of an arterial aneurism, i. e., during the hematoma stage, the pulse in the limb is rapid and weak and may be obliterated, owing to pressure of the clot on the vessel. Makins strongly emphasizes the importance of auscultation as a means of determining the existence of a patent opening in the wall of an artery, since it is the only method of making a positive diagnosis in some cases, e. g., where no pulsation is to be detected in a swollen thigh or calf. The expansile character of the pulsation is never as marked in a traumatic as in an aneurism due to disease.

Signs of Arteriovenous Aneurisms.

Bruit.—This may be short or harsh or even slamming like the whirr or buzz of machinery, as is so well shown in our case. The loud systolic murmur is conducted widely usually peripherally, and to a much less extent centrally. The diastolic roar is conducted in either direction, but, as might be expected, more freely in a central direction in the vein. The height of the pitch of the murmur is a valuable guide to the exact site of the arteriovenous communication.

B. Thrill.—This is not a valuable localizing sign and is in no way comparable to the pitch of the murmur as indicating the actual point of communication of the artery and vein. It is intensified with each cardiac systole. When the murmur and thrill are present together the diagnosis is unmistakable. In the femoral region the thrill will often be transmitted to the ankle below and umbilicus above. The combination of a purring thrill, continuous buzzing murmur reinforced at each systole, with centrifugal transmission of the murmur and pulsation and evidences of stagnation of the superficial veins clinches the diagnosis of arteriovenous aneurism, according to Matas. He also states that the differential diagnosis between an aneurismal varix and varicose aneurism can only be made out clinically when the vessels are situated superficially. Aneurismal varix is characterized by the presence of a vaguely outlined hemispherical swelling, which may be felt through the skin or the cicatrix and rarely exceeds a walnut in size. It can be made to disappear by gentle steady pressure. It may also be made to disappear by compression of the main artery on the proximal side, the swelling reappearing after the removal of the compression. Compression below, on the artery or vein, will increase its size and intensify all the aneurismal signs. If the point where

the thrill and murmur are heard with the greatest intensity is compressed directly, all the physical phenomena will cease at once (Vanzetti's sign).

In varicose aneurisms the tumor formed by the intermediary sac is larger; it cannot be altogether reduced, either by direct compression or by compression on the proximal side of the artery. Vanzetti's sign cannot be obtained as readily as in varicose aneurisms.

From arterial aneurisms the differential diagnosis is made by the purring thrill and the *continuous* "machinery" bruit, which is reinforced by early systolic contraction and propagated centrifugally and centripetally along the veins. In addition to the absence of all these accessory signs, the murmurs heard in arterial aneurisms are *intermittent* and heard only during the cardiac systole.

Differentiation of arterial and arteriovenous aneurisms is based upon the absence in the former of disturbances in the venous circulation, lack of pulsations in the veins, absence of thrill and loud purring and of vibratory murmurs transmitted widely along proximal and distal veins.

Signs of "Dry" Wounds.

Both Fiolle and Perrenot agree that the signs are quite deceptive. The principal ones are absence of the pulse distal to the point of injury, radioscopy of the projectile, and the location of the injury. The latter should always arouse one's suspicion if it is in the path of the vessels of the region involved. When such a "dry" wound is diagnosed or even considered, the orifice of entry should be ignored and the usual incision for exposure of the vessels made. One must remember that absence of the pulse may also occur in contusions with thrombosis of the vessel. The most reliable method of diagnosis in these "dry" wounds is an exploratory incision.

HOW TO TEST THE COLLATERAL CIRCULATION OF A LIMB.

The Moschowitz¹⁰ test has been depended on by some observers in order to determine whether gangrene can be avoided after operations for aneurisms. By raising the extremity while the main artery is compressed and then lowering the limb again, one can observe a marked hyperemia of the skin below the point of compression which remains for several minutes. This gives one a fair test of the degree of collateral circulation. It is more reliable in arterial than in arteriovenous aneurisms because in the latter there is already existing venous hyperemia.

PROGNOSIS.

This depends on the character of the injury, i. e., whether purely arterial, or arteriovenous. If the patient survives the primary loss

¹⁰Beitr. z. klin. Chir., 1915, XCVII, p. 569.

of blood the outlook becomes more and more favorable from week to week, provided that secondary hemorrhage does not occur from mechanical dislodgment of the thrombotic clot or as the result of infection. The danger of gangrene from compression of the collateral circulation by the hematoma has already been referred to. Two factors make the establishment of a collateral circulation difficult: (a) the presence of a hematoma on the soft parts and the collateral therein, and (b) infection increases the tension and favors thrombosis of the collaterals. Both of these according to Exner¹¹ favor gangrene.

A factor in the prognosis which must not be overlooked is the frequency with which cases of blood-vessel injuries, in the early stages, complicated by infection, are erroneously treated for the latter and the underlying vessel injury ignored, until it is too late to save life, the patients dying, especially during the night, by bleeding into their dressings during sleep.

The prognosis in aneurismal varices is much better than in varicose aneurisms (Fig. 4). The former tend to remain stationary but, in the latter, spontaneous cure is practically unlikely, because spontaneous coagulation of the sac contents cannot occur owing to the great activity of intra-aneurismal circulation. In the lower extremity, where the evils of venous stasis, combined with arterial ischemia, are much more severely felt than in the upper extremity, interference is justified (Matas) before the evil effects of the varicose state have been fully established.

TREATMENT.

This is to be considered under the following headings:

1. Circular or lateral suture at the time of injury.
2. Ligation of vessels immediately after injury (above and below point of injury).
3. Treatment of fully formed aneurisms.

Circular or Lateral Suture (Immediate).—The conditions under which the injuries have been received during the present war are most unfavorable to immediate suture or circular resection and suture of the torn vessels. This would be the ideal method of treatment, but can rarely be employed because the facilities for operating such cases are not to be secured at the advanced dressing posts and, by the time that the patient reaches the casualty clearing station, the external hemorrhage has usually been spontaneously arrested. The majority of surgeons on both sides believe that patients with blood-vessel injuries should be transported as little as possible, until the period when an aneurism has been formed, i. e., after three to five weeks, and then should only be transferred to the

¹¹Neue Deutsche Chir., XIV.

base hospitals for operation. I have been unable to find any reports of successful sutures performed immediately after the injury.

Ligations Above and Below Injury (Immediate).—There is still considerable difference of opinion in regard to the question of immediate ligation. Makins¹² believes that it is often followed by a lack of compensation on the part of the collateral circulation, and also that such operations must be performed at a time when the patient is suffering from a loss of blood. This is especially to be considered in the case of ligation of the common carotid artery, which is followed by cerebral softening to a degree quite unapproached by what happens after operations for the cure of aneurisms of lengthy duration. Makins believes that an arterial hematoma should be treated by rest and an expectant attitude. Ligation of the artery at an early date is objectionable if it can be avoided; not only has the collateral circulation not acquired sufficient compensatory enlargement, but the conditions for the proper fulfilment of this process may be seriously interfered with, either by pressure from the blood clot around the wound in the vessel, or still more seriously, by concurrent wounds, or laceration from tearing, of some of the collateral branches themselves. As a result of these conditions, under the best of circumstances, the general nutrition of the limb suffers permanent injury and actual gangrene is not infrequently the result. Beyond this, if wounded collaterals lie in the wall of the cavity of the hematoma, they may not bleed at the time of ligation of the main trunk, and hence are a not infrequent source of secondary hemorrhage. The large majority of the hematomata eventually become false aneurisms. There should be no material difference in the early treatment of arteriovenous aneurisms.

Sencert¹³ advises far more radical early treatment than Makins and the majority of other surgeons on both sides, and operates for diffuse hematoma at once in order to remove the danger of ischemic or infective gangrene, even if the external wound is quite minute. He passes a temporary heavy catgut ligature around the artery above the hematoma and depends upon traction of this ligature to stop the hemorrhage while the hematoma is evacuated and the vascular lesion when uncovered, is ligated.

Makins¹⁴ believes that simultaneous ligation of the main artery and vein is of benefit whether the vein is injured or not, because: (a) the vein offers a too ready exit for the diminished arterial supply, and (b) permits a smaller amount in the collateral circulation to be retained in the limb for a longer time.

R. J. H. Swan in discussing Cowells paper¹⁵ advocated expectant treatment for some weeks for blood-vessel injury, unless a rapid

¹²Brit. Jour. Surg., 1916, III, p. 353.

¹³Lyon chir., 1917, XIV, p. 640.

¹⁴Brit. Med. Jour., Feb. 17, 1917.

¹⁵Ibid., 1917, I, p. 577.

increase in the swelling or increasing pain from pressure upon the nerves should compel one to operate earlier. Swan's statements seem most logical when he says that if an arterial hematoma is opened it may be very difficult to pick up the injured vessel, and a proximal ligature at the point of election is to be avoided because the collateral circulation has not had time to establish itself. The hemorrhage may be from a main branch and not from the main trunk, and ligation of the latter be followed by gangrene.

The advice not to ligate early after an injury is also endorsed by von Bonin,¹⁶ Hotz,¹⁷ Matas, and many others.

Hotz observed hemiplegia in five of six ligations of the common carotid and gangrene in four of six femoral, axillary, and popliteal ligations.

Gebele¹⁸ believes that immediate ligation is indicated for smaller vessels where the interruption to the circulation is not endangered. The only other surgeons who endorse the opinion of Sencert (quoted above) of immediate ligation, are Barbarin and Lerat¹⁹ and Donati.²⁰ The former reports 23 cases, of whom 22 recovered after ligation performed within three hours after receipt of the injury, but of this number three required amputation, one on account of the bone and joint injuries, one on account of gangrene, and one for gas bacillus infection. Donati also advises immediate operation if a vascular lesion is diagnosed.

TREATMENT OF FULLY FORMED ANEURISMS (ARTERIAL AND ARTERIO-VEINUS.)

As in the case of the question of the immediate treatment of vascular injuries, there is still considerable difference of opinion as to a uniform method of treating a fully developed aneurism. This diversity is largely a matter of individual experience, and there will probably always be a number of procedures all leading to an equally good end-result.

The methods employed by practically every surgeon in the treatment of traumatic aneurisms during the Balkan and the present war are one of the following:

1. Ligation above and below the sac.
2. Intrascapular ligation of the orifice of communication of the injured artery with the sac.
3. Suture of the orifice of communication of the injured artery with the sac (Matas endo-aneurismorrhaphy) (Fig. 5).

The general tendency today is to disturb the peri-aneurismal tissues as little as possible, i. e., to do all operative work within the sac. Prophylactic hemostasis is usually necessary and is secured

¹⁶Beitr. z. klin. Chir., 1915, XCVII, p. 146.

¹⁷Ibid., p. 177.

¹⁸Ibid., 1916, C, Kriegschir. Heft., 35.

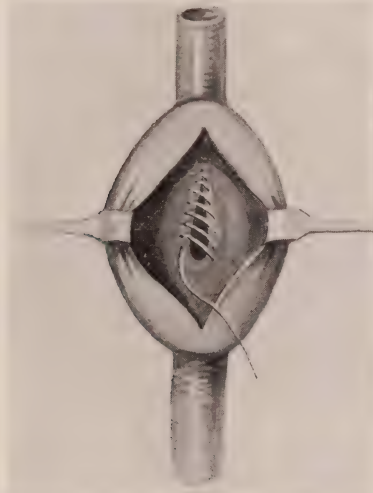
¹⁹Presse med., 1916, p. 401.

²⁰Policlin., Roma, 1917, XXIV, p. 1104.

through the application of an elastic constrictor. It is not necessary to freshen the edges of the orifice in the sac before suturing it. The method of intrasacular ligature was first suggested by Annandale and modified by Kikuzi during the Russo-Japanese war. It consists in opening the sac, removing all clots, passing a probe into the main artery, and with the aid of an incision on each side of the orifice of communication, to pass a catgut ligature around the orifice in the sac.

The Matas operation aims to close the opening in the sac (after removal of the clots) by a continuous catgut suture (Fig. 5).

In the following quotations from the current literature of war aneurisms the two methods just described will be referred to as the intrasacular ligation method and the suture method respectively. Both operations aim to disturb the collaterals as little as possible.



Courtesy of Surgery, Gynecology and Obstetrics.

Fig. 5.—Intrasacular suture of the orifice of communication between the aneurismal sac and the injured artery. This is the restorative endo-aneurismorrhaphy of Matas. (Illustration taken from Matas' article in Vol. 2, Keen's Surgery.)

Makins believes that an expectant attitude should be the method of choice for some weeks. If during this time steady decrease in size and in the firmness and solidity of the swelling take place, a much longer period should be allowed to elapse, in the hope that spontaneous consolidation of the sac, with persistence of the lumen of the artery, will supervene. Such an occurrence is not very rare, and the result is far superior to any obtainable by ligature or excision, and probably in no way inferior to that to be attained by successful suture of the opening in the arterial wall. Again, the later the date (within reason) at which the operation is undertaken, the better are the prospects of finding the vessel sufficiently free in the vascular cleft to allow a fair trial of the operation of suture.

There is no material difference in the early treatment of arteriovenous aneurism; it needs only to be borne in mind that spontaneous cure is not likely to occur. A local operation, with ligation of both vessels above and below the communication, or some form of suture, is the proper treatment for the condition. Aneurismal varices never need early treatment, and it is rare that an operation is required at a later date. The communication may close spontaneously, even after a long interval. Operation is needed most often in the lower limb, and should be of the same character as that recommended for arterial aneurisms.

Exner's results in the Balkan wars are of interest in connection with the expectant method of treatment. Of 24 cases, 12 were so treated until they reached the aneurism stage and all recovered. The remaining 12 either required amputation or died.

Subbotitch²¹ is a warm advocate of the Matas suture method. Schwieker²² and Pearson,²³ on the other hand, both hold that suture is impossible in the majority of cases and that intrasaccular ligation is the most suitable method under the following circumstances: (1) if the artery is small, unimportant or difficult of access; (2) if there is infection in the scar; (3) if the extent of the injury is such that suturing or end-to-end anastomosis is impracticable, or very difficult; (4) if the adjacent walls of the artery are injured or diseased, in which cases thrombosis or hemorrhage will probably follow an attempt at suturing; (5) if the patient's condition is such that any prolonged operation or anesthesia is undesirable. The best time to operate, according to Pearson, is when the surface wounds are healed (two to four weeks) but one must intervene earlier if there are signs of infection in the sac, hemorrhage, rapid increase in size of the aneurism, severe persistent pain, or signs of pressure on the adjacent structures. Silk is used unless infection is present, then Pearson employs catgut. Many cases of arteriovenous aneurism require no treatment. Aneurismal varix requires: (a) division of the connection between artery and vein and suture of the opening in each; (b) ligation of artery above and below anastomotic opening and ligation of intervening branch. Varicose aneurism should be dealt with where possible by the intrasaccular route, opening and clearing the sac and then deal with the wounds in the vessels are required. One should avoid ligating an important vein and artery at the same time, according to Pearson, and, if one must be sacrificed, it should be the artery rather than the vein, except in the case of the internal carotid artery and internal jugular vein. Makins and Crowell both believe that such simultaneous ligation does no harm.

Von Haberer²⁴ believes that the ideal method of treating aneu-

²¹Bull. et mem. Soc. de chir. de Par., 1916, XLII, p. 698.

²²Deutsche Ztschr. f. Chir., 1916.

²³Brit. Med. Jour., 1916, II, p. 796.

risms is suture, circular rather than lateral, because the latter narrows the lumen too much and there is greater danger of thrombosis. Suture is not indicated in very small arteries where ligature assures a collateral circulation. He thinks that there will always be cases in the larger arteries where ligatures must be done, e. g., where large lateral defects or severe infection are present. If ligature is necessary it must be made within the sac or close to it, taking the utmost care of the collaterals. The best time for operation is from two to three weeks after injury unless hemorrhage or severe infection intervene. The strength of a vascular suture is very great and enables the soldier to return to heavy work much earlier than ligature. Paralysis of nerves is a frequent occurrence due to pressure of aneurisms.

Bier,²⁵ in reporting 102 war aneurisms at the Brussels meeting in 1916, also warmly recommended the suture method. This was done in 74 cases. In arterial aneurisms according to Bier lateral suture is easy, the sac being opened, clots removed, the orifice freed and sutured. Operation in arteriovenous aneurisms he believes is more difficult. In all cases the arterial stumps can be united directly by suture because the opening in the artery is very small. The artery runs along the lateral aspect of the sac and can be easily dissected out, even if cicatrices are thick. Even the veins can be freed. It is a cardinal rule that even if the arterial wall is thickened by cicatricial tissue, it is not necessary to go beyond the opening in the artery because the adventitia is chiefly involved in the scar tissue. Circular suture is possible in Bier's opinion even in large arteries. The difficulty of aneurism operations is not in suture *per se* but in the anatomical dissections of the same. Bier has only tried circular suture once in veins, in the other cases the openings in the veins were closed in a longitudinal manner. Where large veins ran through infected sacs they were doubly ligated to prevent pyemia. Bier advises against suturing the artery if infection be present. Even apparently aseptic sacs may be infected and this is the only danger of suture. One should never ligate if one can suture.

Zahradnicky²⁶ collected 425 cases of war aneurisms operated by 45 surgeons in the Balkan and present wars. Gangrene developed in 28 or 11.5 percent. of 242 ligations and necessitated amputations. In 182 sutures gangrene made amputation necessary in 7 or 3.7 percent. The mortality by the two methods was about the same, viz., 7.4 and 7.1 percent. Ligation was followed by gangrene three times as often as after suture of the vessels. Suture would give even better results if an early operation were done before adhesions

²⁴Archiv. f. klin. Chir., 1916, 107, 611.

²⁵Beitr. z. klin. Chir., 1915, 96, 556.

²⁶Wien. klin. Wchnschr., 1915, 27, 999.

had formed, and when there was not so great tendency to thrombosis.

Von Eiselsberg in the discussion of Osler's²⁷ paper, reported 65 cases of which he had done lateral or circular suture in twenty. Five of the 65 died. He believes suture the ideal method. During the Balkan war the consensus of opinion was ligation and extirpation or drainage of the sac, but in the present war, suture is considered preferable.

Swan in Cowell's discussion²⁸ said he had been unable to suture most of his 23 cases. He thinks one should aim to reconstruct the lumen of the injured vessel by suture and when this is not feasible ligate above and below the injury, empty and obliterate the sac by suture. By opening the sac one is sure that no branch leads into it which would keep up the aneurism. Operation is seldom needed in direct cases of fistula between artery and vein, but only when they communicate through a sac. If immediate suture is impracticable then he ligates the artery and vein above and below the sac.

We thus see that it is too early in the present war to arrive at any definite conclusion in regard to the choice of method in the treatment of war aneurisms and only a large statistical report at some later period will serve to give one an idea of the relative value of the various procedures.

²⁷Wien. klin. Wchnschr., 1915, XXVIII, p. 1396.

²⁸Brit. Med. Jour., 1917, I, p. 577.

BOOK REVIEWS.

EXPERIMENTAL PHARMACOLOGY. By Dennis E. Jackson, Ph.D., M.D., Associate Professor of Pharmacology, Washington University Medical School, St. Louis. With 390 original illustrations, including 24 full-page color plates. St. Louis: C. V. Mosby Company, 1917.

The object of the book: To give "exact, specific and detailed directions" in experimental pathology, is fully attained. The very precise directions are supplemented by a wealth of illustrations, showing not only the arrangement of the experiment but also the instruments used and typical curves. Topographical anatomical charts of the various animals used for experimental purposes aid materially in rendering the directions more lucid. In the text the aim is more to explain and guide in conducting the experiment than to describe the results expected and obtained. Frequent short questions call the student's attention to the phenomena to be observed and aid him in forming his own interpretation or as the author puts it, "to develop his power to think."

The number of experiments is a large one, far larger than can ever be gone through by the student in the usual medical course, but the arrangement is such that a judicious selection can be made according to the amount of time that can be expended. The drugs whose action is studied comprises all of the more important ones, also some whose value in therapeutics is now rated lower than in former years. Two special chapters deal with shop work and photography and contain many instructions facilitating the technical part in work of this sort.

A book giving detailed instructions in experimental pharmacology and built up along the lines adopted by Jackson has been a long felt want. Its study will enable the student to later administer drugs in an intelligent and logical manner and help do away with thoughtless empiricism.

One disadvantage that the book presents is that it alone is not sufficient for the student studying pharmacology. It deals so exclusively with the experimental side that a text book becomes necessary. Thus increasing for the student the expense and the amount of study.

If some of the illustrations were eliminated, such as those of simpler instruments with which the student is familiar, who has studied chemistry and physics, perhaps also experimental physiology and surgery, more room could be devoted to didactic text, thus perhaps doing away with the necessity of a text book.

HANDICAPS OF CHILDHOOD. By H. Addington Bruce, author of "Psychology and Parenthood," "The Riddle of Personality," etc. New York: Dodd, Mead & Co., 1917, \$1.50.

The handicaps of childhood discussed in this volume, in the main, are not the physical handicaps familiar to all physicians, but such more subtle characteristics as jealousy, sulkiness, selfishness, lack of self-confidence or of self-control. Such eccentricities of behavior, if persisting into adult age, obviously will imperil not only success and happiness in later life, but health itself.

In a language free of complex scientific terms the author deals with these handicaps, their symptoms, diagnosis, dangers and cure, or, better, their prevention. Many of these defects, as the writer convincingly shows, are the regrettable result of parental indifference, ignorance, or actual neglect, par-

ticularly in the moral sphere. Early home environments must be hygienic to guarantee normal physical development, they must be free from influences that deaden the mind or overstress emotions to permit the undisturbed growth of the physically normal child into normal manhood or womanhood.

Child rearing today must be in harmony not alone with the discoveries of physiology, but also in accord with the precepts of modern psychology. The responsibilities of the physician as family adviser cannot any longer be restricted to the physical side of the child. No book we know will offer the physician a better opportunity to acquire a clear understanding concerning the slight, but definite and important, deviations from the normal, mental condition of the child.

MILITARY OPHTHALMIC SURGERY—MEDICAL WAR MANUAL No. 3. By Allen Greenwood, Geo. E. de Schweinitz, and Walter R. Parker. Authorized by the Secretary of War under the supervision of the Surgeon-General and the Council of National Defense. Philadelphia and New York: Lea & Febiger, 1917, \$1.50.

This little handbook of 115 pages does not pretend to be, in any sense, a treatise on military ophthalmic surgery. Nevertheless, within its covers there is a large amount of information useful to the ophthalmic surgeon in the base hospital and at the cantonment.

Major Greenwood, who contributes the section on military surgery of the eye, is probably the best qualified American to discuss this subject, as he officiated as ophthalmic surgeon in a British base hospital for two years prior to the entry of the United States into the war. Methods which actual experience have proved of value are described. Emphasis is laid on the value of the Kuhnt conjunctival flap in wounds and ulcers of the cornea. There is an illustration of Lancaster's large portable magnet, which has also proved useful in extracting magnetizable fragments from the brain.

Major de Schweinitz' contribution is a chapter on trachoma. The final paper is by Major Parker on ocular malingering and the test used for its detection.

Every oculist who has entered or contemplates entering the service should read this useful manual.

CONSTIPATION, OBSTIPATION, AND INTESTINAL STASIS (Autointoxication). By Samuel Goodwin Gant, M.D., LL.D., Professor of Diseases of the Colon, Sigmoid Flexure, Rectum, and Anus in the New York Post-Graduate Medical School and Hospital. Second edition, enlarged, with 259 illustrations. Philadelphia: W. B. Saunders Company, 1916; cloth, \$6; half morocco, \$7.50.

It is with some disappointment that one reads this rather lengthy volume. Most of the facts therein contained are well known, but this does not prevent their presentation and even their manifold repetition. It may be true, as the author states, that he has met with "flattering success" in the drugless management of constipation, but this does not prevent him from devoting two entire chapters to the drug treatment of the condition. In these chapters we find a great variety of "favorite prescriptions of men prominent in the medical world," ranging all the way from a formula for "Constipation with Difficult Bile Secretion" to a quite lengthy formula for "Constipation with Intestinal Autointoxication and Anemia." The latter half of the book deals with the surgical treatment of various conditions producing constipation.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

JULY, 1918.

No. 7

EDITORIAL.

THE INTERN AND THE LABORATORY—A NATIONAL DEFENSE QUESTION.

The Council of National Defense has come forward with a pronouncement on the subject of the laboratory training of interns so definite as to greatly ease the difficulties of administrators and advisers in dealing with this subject.

It is laid down that whatever part, if any, of the intern's training has to be sacrificed, it must, on no account, be any part of the laboratory work. On the contrary, an opinion is expressed, which in these times should be tantamount to a command, that this field of work should be more intensively cultivated. Particular stress is laid on the supreme importance of the laboratory work connected with the infectious diseases.

The Pennsylvania Board of Medical Licensure has circulated this letter of the Council with a covering note of explanation and emphasis. It is well known that the state of Pennsylvania has a law on this subject that is, in form at least, very strict. Each intern must spend two months in the exclusive pursuit of laboratory technic.

It is probable that the board is as well aware as the Council that the shortage of interns, caused by the war, has rendered this rule, if not a dead letter, at any rate one in a state of reduced animation. Crossing the t's and dotting the i's of the Washington letter, the Board of Licensure calls on the hospitals of Pennsylvania to obey strictly the law, coupling this instruction with the promise (or threat?) of an inspection for the purpose of following up these orders.

The importance of this part of the intern's training requires some emphasis, in ordinary times, in order that hospital boards and committees may be made alive to it. The circular of the Council of National Defense is opportune in arriving just at the change of interns.

While Pennsylvania has a sufficient law on the subject, though one open to criticism in its details, other states are not so prepared, and it behooves them to consider what is the best way to give effect to the requirements of the Washington authorities. Two main systems have been followed, with varieties resulting from compromises between them.

Many clinicians, and a few laboratory workers, are of opinion that the intern on a particular service should do all but the "advanced" laboratory work of that service. Another school of thought would have a laboratory period recognized as a "service" coordinate with the other services of the hospital, and would have the intern during this period do both "routine" and "advanced" work. Both these extremes have much to be said for them and against them, and, whatever laws may be laid down in such matters, it is probable that, in practice, a compromise more or less approaching one or other will be arrived at.

The point of departure of those who favor the first method—that where the intern does all his own routine laboratory work—is that it is in the interest of the patient for the intern to keep personally in touch with this part of the work on his own cases, in order that he may be able to discuss the application of the results more usefully with the chief of the service, and that it is for his own benefit to associate directly these results with the clinical phenomena.

Those who go to the other extreme base their advocacy of the whole-time laboratory service on the observed fact that the average intern, on taking up his work, is not capable of doing even the routine laboratory work in such a way as to furnish a safe guide to the clinician or a creditable record. They hold, therefore, that it is a part of the intern's training to acquire this skill, and that, in large institutions, the routine work should be undertaken by trained technicians. This latter class, therefore, regards the intern's period of laboratory service as purely educational.

To those who urge that this part of his training should have taken place in his last two school years, their reply is that, under present conditions, this is a counsel of perfection, and that, *in fact*, the medical graduate does not usually possess the technical skill called for in routine laboratory work. Laboratory workers whose labors bring them in contact with interns will not hesitate to indorse this statement of fact.

But it is also a counsel of perfection to ask that an intern do all his own laboratory work, *even if he be competent*. Unless, indeed, he has but few patients under his charge and a laboratory handy to his wards, such a rule will usually result in the work being neglected, or "cooked." This is worse than having it done by another intern.

As we are confronted by a demand, which deserves the respect due to an order, from the Council of National Defense, to concentrate on the laboratory training of the intern, and particularly that part of it relating to the infectious diseases, let us first arrive at some standard of what the intern should know of these matters.

Now, at present, all we have any right to busy ourselves with is winning the war. The demands of the army come, therefore, first, and fortunately we have just been furnished with an excellent means of gauging what these are. The sixth of the Medical War Manuals, published by authority of the Secretary of War and under the supervision of the Surgeon-General and of the Council of National Defense, is a manual of the laboratory methods of the United States Army.¹

Except for serology, which is conspicuous by its absence, this manual is evidently intended to cover all the ground of army medical laboratory work.

In the introduction a distinction is made between “. . . simpler clinical tests, such as blood counts, differential counts, simple staining of sputum, . . .” which are to be done by the clinical staffs, and “. . . those clinical tests which require a more elaborate equipment and those examinations which may be spoken of as public health functions, in that they are a part of the control of infectious disease of the camps.”

On examining the contents of this book we are forced to draw other distinctions among the methods described—namely, between the operations which it is reasonably possible for the intern to master during his internship, those of which he may acquire a sound “looker on” knowledge, and those which, if he must learn them, must be taught to him in some other circumstances.

The wording of the circular of the Council of National Defense emphasizing the importance of laboratory work in connection with infectious disease, read with the passage just quoted from the manual, might be taken to imply that these “Public Health Methods” should be taught to interns. This is, flatly, out of the question. In the most favorable circumstances of peace time it is certainly not the business of a hospital to teach these methods to its interns; under present conditions it is impossible to do so. Putting these methods aside, the following table has been compiled from the manual as a suggestion of what could be given to the intern. Items unstarred are those which the intern should master, those starred are the methods of which he should possess a good “looker on” knowledge—i. e., he should understand the aim and general principle of the operation and be able to interpret the results.

¹Laboratory Methods of the United States Army, compiled by the Division of Infectious Diseases and Laboratories. Lea and Febiger, New York, 1918.

Pathology.—The preparation of such solutions and reagents as must be made up fresh or frequently.

- Erythrocyte count.
- Leucocyte count.
- Differential blood count.
- Staining for malaria parasites.
- Examination of feces for entozoa, ova, and amebæ.
- Microscopical examination of urine.
- Preparation and staining of frozen sections.
- Cell counts and "globulin" test on spinal fluid.

Bacteriology and Serology.

- Iso-agglutination tests for transfusion.
- Wassermann and other complement-fixation methods.^{2*}
- Sputum, etc., staining for tubercle.
- Gram's stain.
- Capsule staining.
- Technic of sterilization.
- Preparation of the principal culture media.*
- Standard culture methods, aerobic and anaerobic.
- Obtaining and handling bacteriologic material from patients and from autopsies, including blood culture methods.
- Typhoid and paratyphoid work:
 - Stools and carriers.
 - Endo's medium.
 - Fermentation test.
 - Agglutination test.
 - Blood and urine culture.
 - Diphtheria bacteriology.
 - Meningococcus culture.
 - Meningococcus agglutination tests.
 - Pneumococcus type differentiation.*
 - Cholera cultures.
 - Dark field work for treponema pallidum.
 - Examination for gas bacillus.
 - Bacteriologic control of infected wounds.

Chemistry.

- Urine work:
 - Reaction.
 - Specific gravity.
 - Albumin, qualitative and quantitative.
 - Sugar, qualitative and quantitative.
 - Indican detection.

²Omitted from the manual.

- Acetone detection.
- Diacetic acid detection.
- Bile detection.
- Phenolsulphonephthalein method for renal function.
- Total nitrogen determination.
- Urea determination.
- Ammonia determination.
- Creatinin determination.
- Titrateable acidity.

Blood work:

- Urea determination.
- Sugar determination.
- Creatinin determination.
- Nonprotein nitrogen determination.*
- Colorimetric determination of hemoglobin.

Gastric contents:

- Free and total acidity.
- Bile.
- Occult blood.

Feces:

- Occult blood detection.
- Bile and Schmidt's test.
- Mucus detection.

Such a course as this would take up all of an intern's working hours for two months. But it is the minimum which can be held to comply with the circular of the Council of National Defense, and therefore with the urgent demands of the army.

It is not open to question—one has never heard anyone experienced in laboratory teaching offer to question—that such training is best acquired in a continuous uninterrupted course. The Pennsylvania method is, therefore, the best so far as training is concerned. As compromise is so dear to many of us, let us see how nearly this ideal can be reached by a method combining something of the two main systems.

The course catalogued above is a 400-hour course. With a full 7-hour day and one month's continuous and eleven months' discontinuous work, the nearest approach to the optimum can be arrived at as follows: twelve hours, in two-hour periods, of the continuous month to be devoted to the simple routine urine work and the same amount of time to pathologic blood work; the rest of the continuous month period (180 hours) to be spent on bacteriology and serology.

For the rest of his internship the intern should attend twenty

hours each month, in periods of not less than three hours each. A shorter laboratory lesson involves much loss of time in preliminaries. The distribution of this time among the three laboratories should be in about the ratios 1:2:5 for pathology, chemistry, and bacteriology, respectively.

But no project of reform will be effectual unless backed up by disciplinary measures. The majority of interns shirk laboratory work, and their clinical chiefs are only too inclined to condone this slackness. Discipline inside the hospital and discipline of the hospital from outside are just as necessary as a satisfactory programme, a well equipped laboratory, and a competent staff of technicians.

EDITORIAL NOTES.

No little comment has been excited by the very open attack made at the Chicago meeting by the president of the American Medical Association on the personality of the representative of the profession on the Council of National Defense. The feeling shown by his remarks came as a surprise to most of his hearers, whether in agreement or otherwise with his sentiments.

This was perhaps the stimulus to Dr. Franklin Martin's action at the meeting held recently at Pittsburgh. The three distinguished visitors, Sir James Mackenzie, Sir Arbuthnot Lane, and Colonel Bruce, to hear and see whom the audience had come together, took up a bare forty-five minutes with their three addresses, while the representative of the Council of National Defense took the same amount of time to his one speech. This was occupied chiefly with an account of his personal responsibilities and activities.

Dr. Franklin Martin was followed by Major Jump, who urged the necessity of joining the Medical Reserve Corps. It is strange that at this date the fact that this patriotic duty is incumbent on every physician qualified for the work should still need to be impressed on the profession. Major Jump in fact may almost be said to have shaken the "big stick" at us.

In this respect a speech made a few days later by Dr. Hermann Biggs on the same theme was a decided contrast in manner. It certainly was more approved of, but whether it was more effective is difficult to judge. Maybe we have to be thumped into acting.

A discussion has been carried on in one of our contemporaries turning on the question whether the Chinese first used tea because they found that certain waters, unless boiled, produced illness, or whether the observation, if made, was made *ex post facto*.

Certain it is that the extensive drinking of tea in Australia was

originally induced by its usefulness in disguising the brackish taste of the water which the early settlers so frequently encountered.

By the way, some Anzacs marched through New York the other day. I wonder what the anti-caffeine beverage fanatics have to say about these stalwart six-footers, in superb health and quite devoid of "nerves," who consume, like their mothers and fathers, anything up to ten or twelve cups of strong tea daily?

It is a coincidence that New Zealand, Australia, and Holland are at the same time the nations consuming the most caffeine beverages and having the lowest mortality rates.

Burne Jones and his pre-Raphaelite brethren have been accused of idealizing the goitrous woman. Our patriotic poster designers may be reproached for similarly honoring adenoids. A Maid of Orleans and an American Boy Scout, both of decidedly adenoid facies, have recently figured conspicuously on Liberty Bond posters.

The scientific world has been rudely disappointed. It had held its breath the better to hear the pronouncements of the House of Delegates on some burning scientific questions. It forgot that, even in the Church, the promulgation of dogma was a rare event, and that the precedent set last year when the House decided by vote the purely scientific question of alcohol as a food and drug, may wait some time for a new application.

Apropos, *The Journal of the American Medical Association* published an article in which this dogma was simply ignored, and in which the author dared to lay down the desirability—nay, almost the indispensability—of alcohol as a food (per rectum) in eclampsia. Has he never heard of the statute, "*De Heretico comburendo*"?

ORIGINAL ARTICLES.

MALIGNANT SYPHILIS OF THE UTERUS.*

By GEORGE GELLHORN, M.D., St. Louis,

Associate in Clinical Gynecology, Washington University School of Medicine.

When the sailors of Columbus, on their return from America, brought syphilis home with them, the new disease spread through Europe with startling rapidity.¹ Like any other infection which is transplanted to virgin soil, the disease at first exhibited most virulent characteristics, and the chroniclers at the turn of the fifteenth and during the greater part of the sixteenth century have much to say of the large toll of lives the new "distemper" exacted from humanity. But as the syphilization of the world became more general, syphilis lost most of its acute features and gradually assumed the chronic course with which we are so familiar. Only sporadically do we hear nowadays of an atavistic return of the original acuteness of the disease. For such cases, whether they occur in remote corners of the globe or in our own climes, the term "malignant syphilis" has been coined.

As far as the female genitals are concerned, there can hardly be a doubt that malignant syphilis of the uterus must have occurred at the time when the syphilitic infection of the human race in Europe was in its first stage. But no records from that period have come down to us, and, in the centuries which followed, the study of specific lesions of the uterus was either wholly neglected or so badly hampered by misconceptions of the nature of syphilis that a conscientious search through the literature on our subject has proved futile. It may, therefore, be claimed without fear of contradiction that the observation to be recorded in the following represents the first authenticated case of malignant syphilis of the uterus.

The essential features of this remarkable case have already been reported in brief in a study of syphilis of the internal genital organs in the female which was published by Dr. Hugo Ehrenfest and myself some time ago.² Lack of space forbade a detailed account

*From the Gynecological Service of Washington University at the St. Louis City Hospital.

¹The old controversy as to a possible pre-Columbian existence of syphilis is immaterial to our discussion, and therefore left out of consideration.

²Gellhorn and Ehrenfest: "Syphilis of the Internal Genital Organs in the Female," *American Journal of Obstetrics*, 1916, LXXIII, pp. 864 to 996.

at that time, but the reader was referred to a forthcoming separate publication, an obligation which I now wish to discharge.

The patient was a colored girl of 17 years, who entered the City Hospital November 16, 1915. Previous health fair; menstruation regular, scanty; no conceptions; first intercourse about a year ago; no history of specific infection; had had a yellowish discharge from vagina for past seven months; troubled, for past four months, with severe pain in lateral portions of lower abdomen, lumbar regions, and both thighs.

General examination negative except for the presence of enlarged cervical glands. Tenderness on pressure over lower abdomen, without muscular rigidity. Vulva and vagina bathed in purulent discharge (in which, later, gonococci were demonstrated). Uterus small, retroverted; adnexa normal. Cervix felt eroded and granular, but soft. Speculum: entire cervix covered with a thick, whitish-gray pseudomembrane, which cannot be wiped off easily; the underlying surface bled readily.

A vaginal douche with bicarbonate of soda was ordered and the patient examined again the next day, when the following observation was made. The entire posterior surface of the cervix was the seat of a growth which anteriorly surrounded the external orifice in a semilunar fashion and extended posteriorly to the fornix. Laterally it almost reached the edges of the cervix. It was raised $\frac{1}{4}$ to $\frac{1}{3}$ cm. above the rest of the cervix, and, in general, had a quadrangular shape. Its surface was uneven from the presence of large and small nodules, between which there were irregular fissures. The nodules ranged in size from that of a pinhead to about half the size of a pea. The largest was situated in the median line at the external orifice. In the posterior portion near the fornix the nodules became more uniform in shape and resembled granulations. The edges showed a steep declivity toward the neighboring mucosa, which apparently was perfectly normal. In the right upper corner the edge formed an overhanging projection. The color of the entire growth was a peculiar yellow, which, however, was not due to any covering or coating, but resided in the tissue itself. The yellow color was relieved by fine lines of pink, which, from the distribution, seemed to indicate blood vessels (Fig. 1).

The overhanging edge of the growth mentioned above was snipped off for histologic examination, and a smear was made of the scant serous secretion from the surface. The ultramicroscope revealed in the latter a fairly large number of typical spirochete pallida. Sections of the tissue obtained were stained with hematoxyline-eosin, by Unna's orcein method, and Weigert's fibrin stain, and revealed a dense granulomatous infiltration of lymphocytes and plasma cells, with a large number of newly formed capillaries, many of which

showed endothelial thickening. Squamous epithelium was present only in one place; it was thickened and swollen. Scattered throughout the infiltration a large number of polynuclear leucocytes could be seen. These must be attributed to the action of adventitious bacteria which had gained access after the protecting layer of epithelium had been destroyed. This point was definitely proved by the study of sections stained according to Levaditi's (second) method. After considerable search we found in these sections two



Fig. 1.—An extensive luetic ulceration covers the entire posterior surface of the cervix. It is raised above the surface and exhibits a peculiar yellow color.



Fig. 2.—Section of the tissue of the ulceration shown in Fig. 1, Levaditi stain. Two spirochetes appear in the field.

typical spirochetes, which are shown in Fig. 2. *In another field, and nearer the ulcerated surface, there were several colonies of diplococci which morphologically were identical with gonococci.*

Diagnosis: syphilitic ulceration (secondary) of the cervix uteri. Wassermann test could not be made nor specific treatment instituted, as patient insisted on leaving the hospital. Eight weeks later she again sought admission. This time she was carried in on a stretcher. She was but a shadow of her former self. Greatly

emaciated and markedly anemic, she presented the picture of profound cachexia. She had had no treatment in the meantime and denied having had sexual intercourse. She complained of severe backache, excruciating pain in the left hip, and profuse vaginal discharge. Menses had not occurred in the last two months. Her left leg was flexed in the hip-joint, and attempts at straightening out the limb had to be given up because of excessive pain. There were numerous, small, indolent inguinal glands.

Vaginal examination: About 1 inch above the vaginal entrance the finger was arrested by a growth which completely filled and considerably distended the upper part of the vagina. This tumor occupied the cervix and transformed it into a cauliflower growth the size of a child's fist. The consistency, as a whole, was moderately firm, but in two or three places there were distinctly softer, almost fluctuating, areas. Nowhere, however, could the finger penetrate into the tissues as in carcinoma. The base of the tumor at the cervicovaginal junction was quite hard. The surface, on the other hand, was very soft, almost mushy, and could readily be scraped off with the finger. This manipulation caused but very little bleeding, but was accompanied by profuse seropurulent discharge. The external os could not be located with certainty. Both parametria were infiltrated as in carcinoma. Palpation of the left pelvic wall and along the course of the left vaginal artery was extremely painful. The tumor was so large that speculum examination afforded only a partial view. The color was whitish, medullary, with a yellowish tint. Rectal examination revealed a very small uterus in retroflexion; both tubes and ovaries small. A small piece of the tumor was excised and showed, microscopically, the typical picture of a gumma.

Specific treatment was instituted at once, but, in spite of this, the patient grew from bad to worse and died three weeks later. The temperature ranged from 98.2° to 101.2° and reached higher degrees occasionally during the last week of life. The abdomen became greatly distended toward the last, and the clinical diagnosis was peritonitis from unknown cause.

Autopsy was performed by Dr. C. W. Schery. Both the left labium majus and the entire left lower extremity were edematous. A sharply defined protrusion at the outer edge of the right biceps, the size and shape of a hen's egg, proved to be an abscess filled with a thick, yellowish, nonoffensive pus. Between the upper lip and the left nostril there was a lesion about 1 cm. in diameter, which had all the characteristics of a condyloma latum.

In the abdominal cavity an intense peritonitis, with a large amount of free pus, was found. The latter, thick and yellow, as the one obtained from the arm, amounted approximately to 1,500

c.cm. There were no gummata in the liver, spleen, gastrointestinal tract, or kidneys.

The cul-de-sac was greatly diminished in size on the right side by adhesions around the adnexa, and on the left by the presence of a large retroperitoneal induration. As a result of this the cul-de-sac admitted only one finger. At the level of the promontory and immediately to the right of the sigmoid there was an opening, not much larger than a medium-sized pinhead, through which there was a free flow of pus when pressure was made with the finger in the cul-de-sac. This, then, was the point of perforation of the retroperitoneal abscess which had led to the fatal peritonitis.

The pelvic viscera were removed in toto. This procedure was extremely difficult because of the presence of a hard and diffuse mass in the lowermost part of the pelvis, which was intimately connected with the sacrum. After removal of the pelvic contents it was seen that the last lumbar vertebra and the upper two-thirds of the sacrum were necrosed and that wide openings led into the spinal canal, the left sacroiliac joint, and the left hip-joint. The full extent of the destruction of the pelvic bones could, unfortunately, not be ascertained because we had obtained permission to examine only the abdominal and pelvic cavities.

As to the pelvic viscera, the uterine body was of normal size. There were no adhesions with the sigmoid. The left tube was dark-red in color, swollen, but patent, and with several convolutions in the outer third, upon which a few small and hard nodules were noticed. The left ovary was of normal size and adherent to the posterior leaf of the broad ligament. The tunica albuginea was thick and white, while the center of the ovary contained a round body and was of a reddish-gray color (Fig. 3). A small, yellowish nodule on the surface of the ovary attracted attention by the contrast of color. The left parametrium was diffusely infiltrated.

On the right side dense adhesions between the uterine horn and the adnexa also involved the appendix and fastened the latter to the tube. The arteries were sclerotic, and could plainly be seen over the surface of the tube and in the mesosalpinx. Here and there were small whitish nodules in the wall of the tube, immediately beneath the peritoneal covering. The right ovary was very small and, on section, exhibited calcareous deposits. A diffuse and hard infiltration occupied the entire right parametrium.

The two parametria formed the lateral walls of a large necrotic, retroperitoneal cavity, which, surrounding the rectum, had originally extended to the posterior pelvic wall.

The cervix was the seat of a large cauliflower growth arising from the vaginal fornices (Fig. 4). The external os in the center opened crater-like, admitting the tip of the finger. The mass was very soft, except at the base, and grayish-red in color, interspersed

with yellowish spots or areas. The base of the growth was markedly yellow in color, which contrasted sharply with the darker color of the vagina. The mass was not exactly necrotic, but mushy, and the tissues could not be scraped off with the finger from the surface. (This had been different a few weeks previously, as recorded above.)

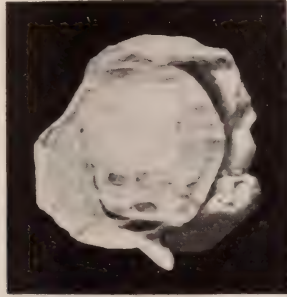


Fig. 3.—The left ovary contains a round body of reddish-gray color, which, on microscopic examination, proves to be a gumma.



Fig. 4.—The cervix is the seat of a large cauliflower growth. The external os in the center opens crater-like, admitting the tip of the index finger. The mass is very soft, except at the base, and grayish-red in color, interspersed with yellowish spots and areas. Diagnosis: gumma of cervix.

The uterus was then bisected, and, as Fig. 5 shows, the pathologic process extended upward into the uterine body, leaving only the immediate vicinity of the uterine cavity and the periphery free. In the fresh state the color contrast between normal structure and diseased tissue was very impressive, and even today, after a year's bleaching in formalin, the yellowish tint of the gumma may be distinguished from the white color of the normal uterine

musculature. It was, further, seen that the gummatous process had extended anteriorly into the vesicovaginal septum and involved a part of the bladder wall. Posteriorly there was a direct extension into the rectovaginal septum. Add to this the lateral extension of the process into the parametria, and we have a picture which closely resembles that of a far advanced case of cancer of the cervix.

I am indebted to Dr. F. A. Baldwin for the following bacteriologic report:

"Smears made from the pus from the peritoneal cavity (and the



Fig. 5.—The gummatous process extends high into the body of the uterus. It involves the bladder wall and the vesicovaginal septum, and continues posteriorly into the rectovaginal septum. In the fresh specimen there was a striking contrast between the normal tissues and the yellow color of the gummatous areas. In the photograph which was taken after a year's preservation in formalin the contours of the diseased portion were traced so as to bring out the lines of demarkation.

abscess on the arm) contained a large Gram negative coccus, growing sometimes in pairs and sometimes in groups of four or five. Cultures were made from the pus on agar, blood serum, and bouillon, and grown at incubator temperature. Examination after forty-eight hours and again after four days revealed no growth on any of the media."

The microscopic examination comprised all parts of the genital organs. In the sections through the ulcerated portion of the cervix there was no sign of normal cervical structures. Only in one slide

a racemose duct could be seen, which represented the sole remnant of the cervical glands. With the exception of a few cells, the epithelial lining of this gland was missing. As to the rest, the entire field was occupied by a dense infiltration of lymphocytes and plasma cells, with a scanty admixture of leucocytes, the latter no doubt the expression of an adventitious bacterial infection. There was an enormous new formation of capillaries, but endarteritic processes were seen only in a few vessels of medium caliber. Around these and the larger vessels there was marked perivascular infiltration (Fig. 6). Within the granulomatous area there were

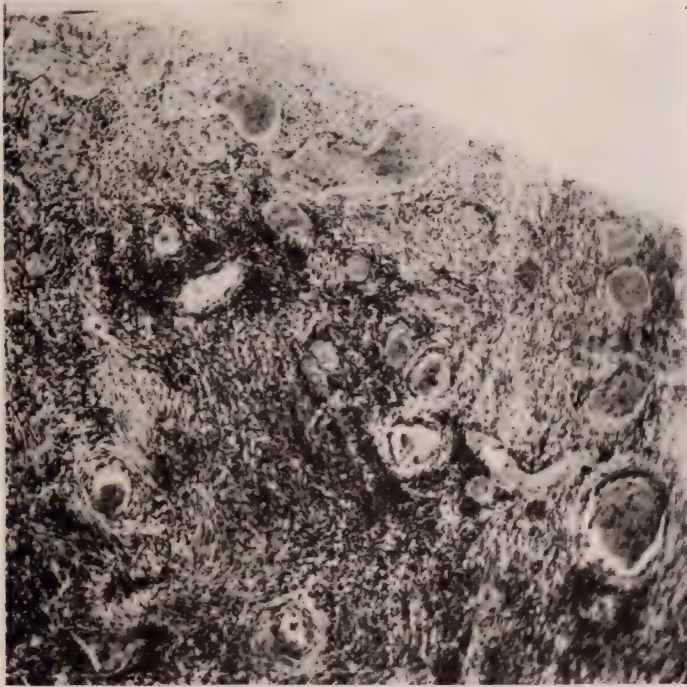


Fig. 6.—Enormous new formation of capillaries. In some of the vessels near the base endarteritic proliferation can be seen. Note the dense perivascular infiltration with lymphocytes and plasma cells.

traces of connective tissue bundles with an occasional spindle-shaped epithelioid cell. Such epithelioid cells appeared here and there in somewhat larger herds, but could well be differentiated from accumulations of plasma cells (Fig. 7).

Sections through the lower part of the uterus and extending through the entire thickness of the organ showed a total absence of surface epithelium. Only the deeper layers of the mucosa remained, and in these a few glandular lumina might be seen, in which the epithelium was largely destroyed. On either side of the uterine canal a strip of muscularis had remained intact; the

nuclei of the muscle fibers were well stained, while the protoplasm was pale and poorly defined. There were also dilated lymph channels, and here and there herds of round cell infiltration. Then followed on either side a wide area of small round cell infiltration, which almost obliterated the sparse muscle stroma. New formation of blood vessels was not pronounced; thickening of intima and media was marked only in vessels of larger caliber, and perivascular infiltration was insignificant. Toward the periphery of the uterus the lymphocytic infiltration became less dense and the muscular (or connective tissue) stroma was better defined.

Sections through the tubes showed, in the main, chronic inflamma-

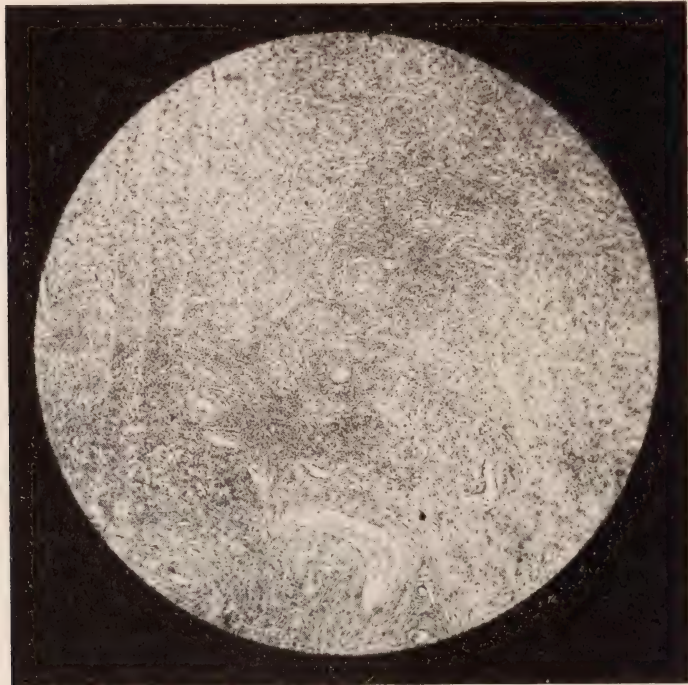


Fig. 7.—Perivascular infiltration, with endarteritic proliferation in the center. Accumulations of epithelioid cells in left upper corner.

tory processes. The papillæ of the mucosa were thickened and fused with one another. In the muscularis beneath the peritoneum there were a few small accumulations of round cells.

The right ovary presented no significant changes. On the other hand, the tumor in the center of the left ovary proved to be a typical gumma. This mass was altogether composed of granulomatous tissue, containing large numbers of plasma and eosinophile cells, particularly in the peripheral portions. The surrounding ovarian stroma contained numerous degenerated follicles. Near the per-

iphery of the ovary a fairly well circumscribed herd of lymphocytic infiltration denoted the beginning of a second gumma.

A large number of sections of the various localities examined were stained after the method of Levaditi and that of Giemsa, but no spirochetes could be found. This, however, does not exclude the possibility that in serial sections through the entire specimen the organism may eventually be discovered, because, in gummata, spirochetes are present only in very small numbers.

SUMMARY.

Our case hardly requires any epicritical remarks. As said before, it has no counterpart in medical literature. Cervical gummata, with more or less extensive destruction of the internal genital organs, have been recorded by Hoffmann, Oppenheim, and a few others, and their reports may be found in the paper previously referred to; but in none of these cases had the disease exhibited that malignant rapidity which had characterized the earliest epidemics of the fifteenth and sixteenth centuries. In the present observation, on the other hand, the acuteness of the affliction was startling.

In this young colored girl of 17 years, a syphilitic infection ran its entire course from the initial stage to a fatal ending in less than a year. The diagnosis was secured by the findings of spirochetes in the secretion and in the tissues of an extensive secondary ulceration of the cervix. A point of unusual interest was the symbiosis of spirochetes and gonococci in the tissues of the ulcer. Within two months this ulceration had changed into a large cauliflower tumor, which, histologically, presented a clear-cut picture of gumma. In this stage the Wassermann test was negative, obviously due to the fact that the marked and rapidly progressing cachexia of the patient prevented the formation of antibodies in the blood. Antisyphilitic treatment was of no avail, and the patient died of a perforative peritonitis from a retroperitoneal abscess between uterus and sacrum. This abscess, primarily, was in all probability a gumma which had extended from the cervix through the parametria into the pelvic cellular tissue and had aroded large portions of the pelvic bones. Secondly, microbes invaded this gummatous infiltration from the necrotic surface of the cervical tumor and brought about an abscess which eventually broke into the abdominal cavity.

Finally, the findings at autopsy of a gumma in one of the ovaries should be recorded because of its excessive rarity.

The rapidity and intensity of the syphilitic process in this case was, perhaps, due to a particularly virulent strain of spirochete, aided and abetted by a racial lack of resistance, as it is well known that in negroes syphilis assumes more severe forms than in white patients.

A DISCUSSION OF THE THEORIES OF CHRONIC INTESTINAL TOXEMIA, INTESTINAL STASIS, ETC.*

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The subject of chronic excessive intestinal putrefaction, as well as the mixed and saccharo-butyric forms, is bound up in such a number of factors that an analysis of the condition as a clinical entity is not easy. In the consideration of the subject we have to deal with the age of the individual, the infection of foods, combinations of foods, the effects of foods upon the bacteriology of the intestinal canal, the bacteriology of the intestinal canal independent of whatever foods are taken, the economic factors pertaining to life, the sociologic conditions under which the individual lives, the status of secretion in the stomach, those poured into the small intestine, those of the intestinal mucous membrane, the status of motility in the stomach, small and large intestine, the rate of transit through the intestinal canal, various infective conditions such as those locked up in the gall-bladder and appendix in as they may infect the intestinal canal, matters of bands, kinks, adhesions, etc. It will thus be seen that what might still be classed as auto-intoxication is far from a simple condition, even in the individual case.

It serves to no purpose to say that because certain toxic bodies are not recoverable from the urine or elsewhere that no such condition as auto-intoxication exists. When one keeps in mind the many factors mentioned above and the various processes that have to do with resorption and assimilation, the oxidizing processes in the general economy, matters pertaining to elimination, the deficiencies that exist in biologic knowledge, the deficiencies in analytical physiological chemistry, one should not say, because no definite substance is recoverable, that no such condition exists. All around us and for many years there have been instances of people who have conditions that can only be due to disorders of these kinds. These individuals are immutable facts and, while scientific medicine has not advanced to the extent of being able to have one recover any definite substance and by doing so make a definite diagnosis, the individuals still are there, and the even suggestive diagnosis and the successful handling show definitely that these conditions are distinct disorders. The simile here would be for one to say that because he was not able to handle a portion of the substance of the

*Read before the Academy of Pathological Science, May 24, 1918.

sun that no such thing as the sun existed, even though the entire world depended on it for life. There are indirect methods of knowing that this body is part of the solar system, and so it is that there are indirect methods of knowing that a condition such as auto-intoxication also exists.

For a number of years this subject has been in the most debatable ground in medicine, and those who have made the greatest contention against the existence of such disorders are those who know the least about them, either in a clinical or laboratory way. There are many people in medicine who because they do not understand a certain subject, directly make the statement that no such subject exists. Clinical facts, however, are facts, and if one approaches the subject with an open mind and largely from the clinical standpoint, he cannot arrive at any conclusion other than autointoxication is a bona fide disorder of mankind and is most common.

In 1887 Bouchard¹ advanced his theories on autointoxication of the intestinal canal. Much, however, that he wrote pertaining to food poisoning, internal strangulation, and infections, such as typhoid and cholera, are not worthy of consideration today.

Metchnikoff² is considered the real founder of what we might call the "school" of intestinal toxemia. His idea that the colon was simply a breeding place for pathogenic bacteria which caused most of the ills of mankind, and which could be successfully combated by the Bulgarian bacillus, is now an exploded theory. In this connection it may be stated that Metchnikoff is not entitled to the credit of drawing attention to bacteria as having to do with the infection of the intestinal canal. Certainly before 1907, Christian Herter³ had been working for several years on the subject, and it may be stated that comparing the works of Metchnikoff on the one hand and the works of Herter on the other, those of Herter have stood the test of time, and, in my opinion, are the best expositions on bacterial infections of man that have yet been advanced.

Following this was the work and the propaganda carried out by Sir Arbuthnot Lane⁴ in which he undertook to draw attention to stasis, ptosis, and toxemia as having to do with these conditions and strongly suggested operative interference for their alleviation and cure. According to him the primary factors are mechanical. The process begins with an overloading of the large bowel, especially in the right side, due largely to the erect position, and exaggerated by corsets and defecation in an upright sitting position. Stagnation in the cecum with distention and descent into the pelvis

¹Bouchard: *Leçons sur les Autointoxications, etc.*, Paris, 1887.

²Metchnikoff: *Scientifically Soured Milk; Its Influence on Arresting Intestinal Putrefaction, etc.*, Paris, 1907; *The Prolongation of Life, etc.*, New York and London, 1908.

³Herter: *Bacterial Infections of the Digestive Tract*.

⁴Lane: *Chronic Intestinal Stasis* (Trans. of the Amer. Surg. Assn., 1909, p. 23); *Operative Treatment of Chronic Constipation*, London, 1909; *The Kink of the Ileum in Chronic Intestinal Stasis*, London, 1910.

follow; adhesions form across the lower end of the ileum and the appendix in an attempt to hold the cecum in position. The strain on the right colon makes it difficult for fecal matter to pass, and adhesions form to hold the bowel in place. These tend to contract, pulling the hepatic flexure up higher than normal. The same process finally takes place on the left in which the transverse colon sags, drags on the stomach and pulls it down, and adhesions form about the pylorus, duodenum and gall-bladder. The sigmoid becomes distended, shortened and straightened, or much distended in the middle and caught at both ends by adhesions. The adhesions across the lower end of the ileum anchor the ileum forming the famous Lane's kink, the whole process of adhesion formation having, according to Lane, its origin in strain and the resulting "crystallization of lines of strain." Following out his theory, stagnation in the bowel causes abnormal putrefaction of the contents, and the absorption of toxic material produces a degenerative change in all the structures of the body. With this idea he swept in all the ills of mankind throughout the world as directly or indirectly due to stasis, the following conditions being caused (taken from the writings of Lane, Watson⁵ and Charles H. Mayo⁶): Appendicitis, arteriosclerosis, arthritis, carcinoma of the ovaries, cholecystitis, circulatory disturbances, colitis, constipation, curvature of the spine, cystic degeneration of the ovaries and breasts, diarrhea, endarteritis, epilepsy, foul perspiration, floating kidney, gall-stones, gastric and duodenal ulcers, gingivitis, gout, interference with respiration, intestinal obstruction, loss of sexual desire, loss of control of temper, loss of vitality, mastitis, migraine, muscular atrophy, neuralgia, neurasthenia, pancreatitis, pharyngitis, pigmentation of the skin, pyorrhea, renal disease, tuberculosis, uterine versions and flexions, visceral ptosis, volvulus.

While it is true that all the above conditions can be, and often are caused by autointoxication, the truth is that they are nowhere near as definitely resulting conditions as Lane would have us believe. More than that, the theory of Lane will not stand close analysis, either from the clinical standpoint or from the standpoint of results after operation upon people who have conditions such as Lane suggested could be relieved or cured by various operative procedures. The trouble with Lane's contention is that he considers the subject entirely from a mechanical standpoint, and the subject is biologic. He dealt with a biologic subject in which he advanced drainage surgery for its correction, with the idea that by changing the fecal current he could alleviate most of the disorders of mankind after God had given mankind the intestinal canal that

⁵Watson: Chronic Intestinal Stasis (Clin. Jour., London, June 30, 1915).

⁶Mayo, Charles H.: Resection of the First Portion of the Large Intestine, etc. (Jour. Amer. Med. Assn., Aug. 8, 1914, p. 446); Removal of the Right Colon, etc. (Jour. Amer. Med. Assn., Sept. 9, 1916, p. 779).

he did. Still, it is true that stasis and ptosis are factors in connection with toxemia, although the method which Lane suggested for their cure is not the best. I feel that after all Lane's propaganda there is perhaps ten percent of worth in what he has done. The rest of it immediately began to fall when ambitious surgeons throughout the world took his propaganda as he advanced it and accomplished baneful results from the operative procedures he suggested. Then in 1913 Kellogg⁷ published his papers attempting to demonstrate that practically all of Lane's list of diseases with a few more added, were due to the incompetency of the ileocecal valve, allowing reflux of the contents of the colon into the ileum suggesting at the same time as a method of treatment the surgical procedure of tightening the valve a bit to prevent the reflux, and advancing the opinion that this was a safer method of procedure. Kellogg went so far as to say that a Lane's kink was due to incompetency of the ileocecal valve, and this in the face of the fact that many perfectly normal individuals have Lane's kink and incompetent ileocecal valves without any symptoms from either one, and even from a combination of them.

In 1913, Martin⁸ of Philadelphia and myself showed that Lane and Kellogg were wrong, and that the primary cause of trouble for which surgery was warranted is a stenosis, or stricture somewhere in the enteric canal, although Martin suggested that this stricture was of the ileocecal valve, causing retention of the waste products of digestion in the ileum, and that in certain cases the valve opening should be enlarged by a simple surgical procedure which he describes.

Then came along Case with a paper he read in Chicago showing that many of the abnormalities which could be noted by the x-ray to exist in the right abdomen were really due to obstructive conditions in the sigmoid.

Up to the present then we have the theory of Bouchard, that of Metchnikoff and Herter, that of Lane, that of Kellogg, the one of Martin, the one of Case, to which may be added other theories such as the one of Keith,⁹ that intestinal stasis is always secondary to a neuromuscular disorder of the bowel, due to a disturbance at the nodal points, and this is the theory that I partly believe in, with the addition that when definite obstruction exists, this may be a cause also. Later came the one of Beveridge, who thought that these disorders were due to disturbances in the internal secretion of the ductless glands, and that these could produce disorders such as putrefaction in the intestines. And lastly the one of Goldthwait in which he ascribed anatomic and mechanical causes for prac-

⁷Kellogg: Incompetency of the Ileocecal Valve, 1913; *Surgery of the Ileocecal Valve* (Surg., Gyn. and Obstet., Nov. 13, 1913, p. 563).

⁸Martin, Edward: Paper read at Boston Med. Library, Nov. 19, 1913; *Therapeutic Answer to Chronic Right Iliac Pain*.

⁹Keith (Brit. Jour. Surgery, 1914-1915, XI, p. 576).

tically the same list of diseases that Lane had given with a few additions, such as goitre, eye trouble, mental disease, diabetes, and race degeneration, and stated that they were due to anatomic anomalies in the skeleton and improper posture resulting in pressure on various organs, causing a multitude of troubles, many of which might be relieved or cured by a change in posture. He included in one of his statements, "One occasionally sees convulsions stopped instantly by a mere change of position" in epilepsy, to which I would add that frequently whatever method of treatment, and even just the attending of a new physician, will cause the epileptic to be free from attacks for some time. And also Goldthwait states in speaking of diabetes, "One has seen cases in which after most careful dieting the sugar has persisted, and then after supporting the organs properly the sugar has wholly disappeared," to which I would add that this should not be taken too literally as a cure or a method of relief in cases of diabetes.

In 1899 Adami wrote instructively on "Latent Infection" and "Subinfection," and again in 1914 an exhaustive article on "Chronic Intestinal Stasis," taking the view that low-grade infections are the primary causes in most of the same much-discussed group of diseases that have been mentioned. Since 1911, Billings, Rosenow, and many others have written on focal infection as the cause of arthritis, appendicitis, gastric and duodenal ulcers, and many other diseases in the above mentioned group.

We have, then, a more or less well-defined group of some forty or fifty diseases and morbid conditions, whose direct etiology is difficult to prove, and about a dozen men of experience and standing in the profession, each advancing some one condition as the primary cause of all the diseases, and each presenting series of cases and clinical evidence to prove his contention. Manifestly they cannot all be right, and yet, they are not all of them wrong. To express my own opinion I would again present the opening paragraph of this paper: "The subject of chronic excessive intestinal putrefaction, as well as the mixed and saccharo-butyric forms, is bound up in such a number of factors that an analysis of the condition as a clinical entity is not easy. In the consideration of the subject we have to deal with the age of the individual, the infection of foods, combinations of foods, the effects of foods upon the bacteriology of the intestinal canal, the bacteriology of the intestinal canal independent of whatever foods are taken, the economic factors pertaining to life, the sociologic conditions under which the individual lives, the status of secretion in the stomach, those poured into the small intestine, those of the intestinal mucous membrane, the status of motility in the stomach, small and large intestine, the rate of transit through the intestinal canal, oral and faucial sepsis in how they may directly infect the gastrointestinal canal, various infective con-

ditions such as those locked up in the gall-bladder and appendix, in as they may infect the intestinal canal, matters of bands, kinks, adhesions, etc. It will thus be seen that what might still be classed as autointoxication is far from a simple condition, even in the individual case.

It can be deduced from the above that chronic excessive intestinal putrefaction and fermentation may be divided into two classes, the primary and the secondary. The primary ones are those which are due to definite infective conditions running chronically in the intestinal content and in the gut wall, while the secondary ones are those which are due to disorders which unfavorably influence the status of affairs in the intestinal canal and bring on the autointoxication in a secondary way. Bouchard, Metchnikoff, and Herter dealt with a primary cause; Lane dealt with a resulting cause—a stasis which is brought about by a hit of the motility due to resorption of bacterial products. However, it must be said in instances where definite obstruction exists due to bands or kinks, that we then deal with a definite condition for which operation may be indicated, although rarely the absolute cure of the case, unless obstipation exists. However, Lane should not be given the credit for the benefit of cures from this standpoint, because American surgeons for a long time have been operating upon infected conditions such as diseased appendices and so on, and have been relieving bands, kinks, adhesions, etc., which have to do with anchoring or binding down the gut. Then there is the development, from bacterial changes in primary intestinal toxemia, of a degeneration which takes place in the sympathetic fibres between the muscle planes, which may extend into the sympathetic paths extraenterically, even as high as the sympathetic plexuses in the back of the abdomen. When enough degeneration has taken place dilatation of the viscus which is supplied by these sympathetics occurs, and atony with stasis is the result. Such may cause a sagging of heavy organs which further add an item of delay. Thus, my opinion is that Herter was correct in his opinion as to the original cause, this bringing about that of Keith's, which in turn can bring about conditions such as Lane described within the abdomen.

Toxins formed in the bowel may conceivably be of four types,—first, products of disintegration of food stuffs by the digestive juices; second, products of disintegration of food stuffs by bacterial activity; third, the ectotoxin discharged by the intestinal bacteria, and fourth, toxins from the dead bodies of bacteria.

In regard to the first type, peptones, proteoses, etc., from proteid digestion are toxic only when introduced directly into the blood or tissues. It has been stated that these could not act as toxic bodies and that if they were introduced, which is not possible since they are not absorbed unchanged by the healthy bowel, only anaphylaxis

could take place. It may be well to remember that in the presence of boiling mineral acid proteins give rise to the following bodies; diamino acids, or hexone bases; lysin, arginin, histidin, ammonia, monamino acids, the aromatic series such as phenylaminopropionic acid or phenylalanin, tyrosin, indolaminopropionic acid or tryptophan, and finally the fatty series such as leucin, glyocol, aminopropionic acid or alanin, aminovalerianic acid or butylalanin, aspartic acid and glutamic acid. It must, therefore, be remembered that products such as peptose, proteoses, etc., never gain entrance into the general economy, but such that may be the fragments of the albuminous molecules as far as the amino acids and no further. These amino acids may easily gain entrance into the general circulation.

Somewhat the same bodies are formed in laboratory digestion of albuminous substances, with the exception that, in this condition, the digestion proceeds further in the way that a part of the amino acids is split up into fatty and aromatic bodies, such as are represented in the aromatic bodies derived from the decomposition of tyrosin and tryptophan; the aromatic oxyacids, phenols, the indoxyls, and the skatoxyls. In the simple action of pepsin upon the albuminous molecules we have, in addition to the non-crystalline bodies, ammonia and the diamino acids, monamino acids, also the aromatic series such as is represented in tyrosin, tryptophan, and phenylalanin, and the fatty series, leucin, glyocol, alanin, glutamic acid. The gastric digestion, therefore, gives rise to the same products as the action of the acids. The digestion by trypsin gives rise to the same bodies as gastric digestion and the action of boiling acids, the only difference being that trypsin has an action incomparably more powerful, and especially more rapid than pepsin.

Microbic decomposition of albuminous molecules, in addition to non-crystalline bodies, are ammonia, diamino, and monamino acids giving rise to the aromatic series, also those of the fatty series, and finally, fatty bodies such as butyric, caproic, valerianic acids, various ptomaines, and bodies of the aromatic series such as those of the oxyacid group, paraoxyphenylacetic acid, paraoxyphenylpropionic acid; the phenol products such as phenol and paracresol; the group of indoxyls, indol and skatol, and various gases such as methane, hydrogen, carbonic acid, sulphureted hydrogen, and methylmercaptan. From this it will be seen that the microbic digestion gives rise, not only to amino acids, but also to the products of their secondary decomposition; the aromatic and the fatty bodies. The effect of the bacteria upon the albuminous molecules is increased as descent down the intestinal canal is accomplished. It is probable that in health the bacteria of the small intestine do not exercise any unfavorable action upon the albumin, but do cause considerable fermentation of the carbohydrates with the formation of alcohol and fatty acids, such as lactic and succinic. These acids

act to inhibit the action of the proteolytic bacteria, but prevent the putrefaction of nitrogenous bodies.

Albuminous putrefaction occurs mostly in the large intestine in which the reaction is more or less alkaline. Hence it is that normally the fermentation of the carbohydrates takes place in the small intestine and that the putrefaction of the nitrogenous bodies occurs in the large. In extreme cases of putrefaction the action of the proteolytic bacteria begins in the lower portion of the small intestine and, according to some of my observations, almost in the middle in a few. According to Combe¹⁰ the toxic bodies produced by the disintegration of the albuminous molecules through the influence of microbes are classified as first, the fatty volatile acids; second, the ptomaines and leucomaines; third, the aromatic bodies; fourth, the gases.

Whenever the fatty acids accumulate in the blood, there results an acid intoxication, or acidosis, which is characterized by a diminution in the alkaline bases of the blood. This acidosis is supposed to occur only when the fatty acids are formed in excess, and this rarely happens except under the influence of the breaking up and fermentation of the ternary bodies, the fats in particular.

It is probable that the fatty volatile acids are not a considerable factor in the production of toxic symptoms. Regarding the leucomaines, little is known excepting that pertaining to the lecithinic leucomaines, such as that found in the yolk of eggs, brains of animals, fish roes, and milk, and meat in slight proportions. The intestinal microbial putrefaction in decomposing these foods produces neurin and muscarin, violent poisons. As to how much these substances may affect the body it is not possible to state, because there have been no methods keen enough to examine them so as to recognize them in susceptible amounts, but it may be considered that they are factors of importance at times.

The ptomaines are basic bodies produced by the microbial decomposition of the amino acids. They were discovered by Selmi in dead bodies, and for that reason he named them ptomaines. Some are harmless, others extremely toxic. Their formation by reduction can take place by the action of the anaerobic bacteria of the intestine.¹¹ We possess actual knowledge of several ptomaines belonging to the fatty acid group, ethylenediamine, trimethylenediamine, putrescine, cadaverine, hexamethylenediamine; other ptomaines such as pyridine, paroline, and collidine are derived from complex nuclei, and there are a large number of others the composition of which is unknown. All of the above-named substances have been recovered in stool and urine from cases of various conditions. It is a well-known fact that in intestinal putrefaction a

¹⁰Combe, A.: *Intestinal Autointoxication*.

¹¹Lecoq (Biol. médic., III, p. 368).

relatively large quantity of ptomaines is produced in the intestine. Part of these ptomaines are undoubtedly absorbed, circulate in the blood and may cause toxic phenomena before being eliminated through the kidneys. Unfortunately we do not yet possess any really practical method for detecting the ptomaines or ascertaining their quantity.

That certain aromatic bodies are derived from the putrefaction of nitrogenous food in the intestine is well known. It is also known that a man in a state of inanition may nevertheless produce phenol and indol, even when the intestine is empty and contains no food, this probably being produced from the intestinal secretion. While the indols and the phenols are derived from the putrefaction of nitrogenous foods in the intestine, it seems to be settled that the oxyacids are derived from the body tissues.

Very probably another aromatic body is derived from the putrefied intestinal juices and most probably from bile. The nearest approach to this is a substance known as chlorocholic acid. It is suggested by Combe that aromatic substances are derived solely from the intestinal putrefaction of the proteins existing in the food and intestinal juices, hence their proportion augments with the intensity of intestinal putrefaction. Other aromatic products are those of the aromatic oxyacids: paraoxyphenylacetic acid, paraoxyphenylpropionic acid, paraoxybenzoic acid, homogentésinic acid, aromatic acids, rhenylacetic acid, phenylpropionic acid and hippuric acid. Other toxic bodies are those known as the phenols, the indoxyls, skatol, brencatechin, very minute doses of hydrochinon, alkapton, and the various intestinal gases such as carbonic acid, methane, sulphureted hydrogen, and others.

Against the introduction of these toxic substances when formed in the general body there are certain antitoxic functions of the organism. These may be described as the character of food, the antitoxic factor of elimination preventing absorption, the acidity of the gastric juice, the bile, the pancreatic juice, the reaction of the small intestine, the flora of the large intestine, the defences of the mucous membrane of the intestine, the liver, the antitoxic glands, and finally the general oxidizing process which takes place as a consequence of metabolism.

It is a well-known fact that the intestinal bacteria are not required to carry on the ordinary digestive processes of normal nutrition. This being true, the question may be asked why it is that when so many billions of them are constantly present in the intestinal canal that certain authors can make the statement that they cause no harm. It is impossible to avoid the entrance of bacteria into the digestive tract. For example, the *B. lactis aerogenes*, *B. coli*, *B. bifidus*, soon adapt themselves to the secretions of this part of the body, and ordinarily hold their own against newcomers. By

virtue of their adaptation they are not ordinarily harmful to their host. Under certain circumstances they are capable of doing service by giving rise to conditions which discourage the growth of many harmless and harmful species which man cannot readily exclude from his digestive tract. There are many conditions which influence the character and extent of bacterial decomposition in the alimentary tract. Among them are the chemical character of the food, the solubility of the food in the digestive juices, and the volume and composition of these digestive juices. Intermingled with these factors of food and secretory activity is the influence of aerobic and anaerobic conditions in the digestive tract and the nature of the bacterial activities which occur there. The initiation of putrefactive decomposition in the digestive tract depends very largely, but probably not exclusively, on the activities of obligate anaerobes, and a portion of the digestive tract is at all times under anaerobic conditions. While the facts all point to the correctness of this view it must nevertheless be remembered that the intestines abound with microorganisms which are able to attack albumoses and peptones, and to affect the further degradation of the proteid molecule, thus entering into a symbiotic action with the strict anaerobes. This symbiosis of anaerobes and aerobes is a biologic phenomenon of consequence in determining the distribution of anaerobic bacterial processes in the digestive tract. Without such symbiotic action the development of strict anaerobes would be confined to those parts of the digestive tract into which oxygen passes rarely, and then only in small amounts. The large intestine is seldom visited by free oxygen, but it is probably usual in man for the small intestine to contain a little air.

If the stomach exciting is slow, the chances for anaerobic development are good, and hence under these circumstances we frequently find that there are evidences of putrefactive decomposition of food that has been unduly retained in the stomach—namely, the presence of sulphuretted hydrogen, mercaptan, butyric acid, etc. On the whole, however, in the average case of intestinal toxemia which we see, no gastric condition can be ascribed as a contributing cause, in fact, many gastric conditions are secondary to intestinal toxemias.

While in a few cases of intestinal toxemia it can be proven that putrefaction takes place in the lower end of the small intestine, the usual thing is that it takes place in the colon where anaerobic conditions are more perfect. In the colon the anaerobic conditions are well maintained throughout its entire course and here we find the greatest number of anaerobes and the most pronounced evidence of putrefaction. There is, however, a gradual fall in the number of living bacteria beyond the ileocecal valve so that in the rectum the numbers of cultivable bacteria are very much less than in the

ascending colon. There is evidence to prove that, under certain conditions, the restraint against bacteria which would be inimicable to the host may be overcome by errors in diet, depressed general conditions, or alterations in the secretions of the digestive tract, and that thus definite infection by the hemiparasitic bacteria that are present becomes possible, that is, infection of the intestinal content.

Toward adult life great differences exist in the habits of different persons, and these are in a degree reflected in the nature of the bacterial processes of the digestive tract. In adult life there are the individual experiences, new responsibilities, new dangers, an enhanced emotional life, and often a greater proportion of indoor and sedentary habits. The dietary is apt to undergo an alteration in the direction of increased and frequently injudicious liberty and the use of tea and coffee, etc., also the use of tobacco and alcoholic drinks is either increased or begun. Sooner or later these things lead to slight derangements of digestion which manifest themselves clinically. It is not unusual to find people who are over fifty years of age and perfectly robust and apparently well, who possess a slight degree of inability at work and at times feel tired. With such persons it is not unusual to demonstrate the presence of increased numbers of putrefactive anaerobes in the intestines. These persons, though in good health, are not robust. A period of sustained hard work is followed by considerable mental and physical fatigue. Dining out and the use of alcoholic drinks are indulgences quickly followed by unpleasant consequences. Exercise out of doors becomes more and more of a necessity, and the individual becomes conscious of having to live within certain conditions compatible with the performance of his duties.

STUDY AND PREVENTION OF TUBERCULOSIS.

Some Medical Aspects of the Work of the Framingham Community Health and Tuberculosis Demonstration of the National Association for the Study and Prevention of Tuberculosis.

BY CHALLIS BARTLETT, M.D.,
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The Framingham Community Health and Tuberculosis Demonstration has been in actual operation for a little over a year. This experiment and demonstration is under the supervision of a committee organized by the National Association for the Study and Prevention of Tuberculosis. The Metropolitan Life Insurance Company of New York donated the sum of \$100,000 to carry on this demonstration.

Framingham was selected for this demonstration because it possessed most of the qualifications necessary for carrying on such an experiment. The community is an industrial one with a great variety of industries, its people are of many races, its own health organization is good, it has had an *average* amount of sickness, it has good physicians and good hospitals, its people are willing to help, and it is fairly representative of rural, suburban, and city life.

The medical profession from the first has been most helpful in the organization and carrying on of this work. The physicians of Framingham and the surrounding towns first organized a Medical Club in cooperation with the Community Health Station. This organization has conducted a series of lectures, during the last winter, on tuberculosis. The lectures have been largely attended by the physicians and several of the lectures, of a general nature, have been open to the public.

The Community Health Station in the early part of the work offered to the physicians of this town a consultation service. This service has been constantly taken advantage of and as a result many cases of tuberculosis have been discovered. The Community Health Station has one full time physician for clinical work and frequently calls in physicians from Boston for part time services.

During the first year of active work 5,000 of the people of Framingham, about one-third of the population, have had a physical examination. As a result of this campaign there are now under observation nearly 200 people who have either had tuberculosis

and the disease has become arrested or who have the disease in an incipient or far advanced stage. In the physical examination work about 80 percent of the people examined were found to have some physical defect. Many of these, of course, were minor defects, such as teeth, etc., but there were found a considerable number with serious circulatory or other chronic conditions. All of these cases have been referred to their own physicians for follow-up or treatment.

Early in the work of the Demonstration it was deemed advisable to standardize, as much as possible, the diagnosis of pulmonary tuberculosis, and a committee of experts were asked to formulate diagnostic standards to be used in the Demonstration. "Diagnostic Standards" have proved very useful and have been carefully followed out in our work. The Committee in charge of the Demonstration have now asked a committee of experts to formulate diagnostic standards for non-pulmonary tuberculosis.

The town has greatly helped in this Demonstration and at the present time there is a full time physician and nurse employed for the schools, also a dental clinic with a part time dentist in charge, open air rooms, and school lunches. Two baby clinics are also in operation. Two of the largest industries have provided rest rooms and restaurants for their employees and full time nurses for their help. One of the industries has also added a full time physician and two more are contemplating adding a physician to their staff. The Board of Health has a full time health officer and nurse, the nurse giving most of her time to the care of tuberculosis cases.

A Von Pirquet tuberculin survey has been made of children between the ages of 1 and 7 years. About 25 percent of the children in the town of this age group were secured for this survey. All the children with positive reactions in this survey have been examined once or twice physically and will be followed up by the nurses and physicians constantly during the time the Demonstration is carried on.

The results of this survey showed that of the 460 children on whom the test was tried 33 percent reacted positively. The following table will show the reaction according to age and district:

Ages	Coburnville south of track		Saxonville		Lokerville		Union Avenue center.		Totals	
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
1-2	8	17	0	6	1	24	1	10	10	57
2-3	13	17	0	14	2	8	1	10	16	49
3-4	13	18	2	8	5	15	4	13	24	54
4-5	13	17	4	12	1	19	3	10	21	58
5-6	20	14	6	9	6	9	8	5	40	37
6-7	20	20	6	11	12	8	5	12	43	51
Total	87	103	18	60	27	83	22	60	154	306

Coburnville, a typical industrial district, with housing conditions particularly poor, includes most of the Italian population.

Saxonville is a somewhat isolated district with one industry, a woolen mill. The population is made up largely of Irish-Americans, French Canadians, and Jews.

Lokerville is of a mixed make-up economically, with no very heavy percentage of any foreign group.

Union Avenue and the Center is a section largely devoid of industries, containing the residences of many of the middle-class and more well-to-do families.

One hundred and nineteen children of the positive group were examined carefully immediately following the Von Pirquet test and a numeration of their impairments is as follows:

Enlarged tonsils and glands	82
Enlarged tonsils alone.	11
Enlarged cervical glands alone.....	17
Acute colds, coryza, etc.....	14
Advanced teeth decay.....	5
Ear discharge	3
Broncho-pulmonary signs and symptoms.....	11
Positive D'Espines signs.....	7

These findings, of course, overlapped and intermingled in the individuals of the group. Of the 119 children, 97 had entirely normal chests by auscultation and percussion.

In the physical examination of these positive cases no active cases of tuberculosis were discovered, even under 5 years of age. It is the intention to follow these children carefully to make physical examinations from time to time and to try to have the minor defects, such as teeth, tonsils, etc., corrected.

The tuberculosis death rate for Framingham has been similar in the past to that for average communities of this size. The period 1906 to 1916, with corrections resulting from a special study of the reliability of death certifications, averaged 120 per 100,000.

Before the Demonstration started there were approximately 35 cases of tuberculosis known in the town. As a result of the examination of about 5,000 people a morbidity rate of 2 percent has been determined. This rate applied to the town would give approximately 320 cases of *active* and *arrested* tuberculosis. Further, on the basis of these examinations it is indicated that there are about 10 cases of *active* disease for every death. These rates, of course, are not absolute and it will be necessary to check them up with the work during the next two or three years to prove their absolute reliability.

In conclusion it is believed that the Community Health and Tuberculosis Demonstration has shown that communities are interested in community health problems and that active cooperation can be obtained to promote the health of the community.

This experiment was established to determine if it were possible to discover and properly treat the great majority of cases of tuberculosis in an industrial community. The experiment, while by no means completed, has proved that with an organization such as is now at work in Framingham, and with the cooperation of the existing agencies, a much greater proportion of the tuberculous population can be discovered and supervised than has been the case before in any American community.

THE AFTER-CARE OF THE CRIPPLED SOLDIER.*

BY ARCHER O'REILLY, M.D., St. Louis.

In France and in Great Britain practically every able-bodied man is under arms, and this holds true in the other belligerent countries. Almost one-fifth of the casualties represent men who have been killed in action, or who have died as a result of war wounds, and it is said that there are 13,000,000 wounded and crippled soldiers in the belligerent countries of Europe, including 3,000,000 cases of amputation. On a basis of 1,000,000 United States soldiers at the front, it has been estimated that 100,000 disabled men will be returned during the first year of fighting. Of this number at least 20,000 will be incapacitated, partly or completely, from pursuing their former occupations. If the war lasts three years, with the addition of 1,000,000 fighting men a year, we shall have 120,000 incapacitated.

What are we going to do with these men? This problem has been met by the European belligerents, and at present must be solved by the United States.

In former wars, which have all been insignificant compared with the present one, the armies have been small, and the number of cripples has been small. These were given a meager pension, were put into homes for crippled soldiers, or were given simple employment, such as watchmen and similar jobs; or they became mendicants, and depended on public charity and pity, to live out a meager existence. In the present struggle, however, not armies, but whole nations, are in arms, and the number of disabled soldiers is so great that their care after the war is a very serious one. The problem is both social and economic.

A crippled soldier who is unemployed soon becomes discontented, degenerates morally and mentally, and becomes a focus of discontent for those about him and a menace to the state. At the present time, however, the crippled soldier is also an economic problem. With the vast destruction of man power, and the great increase in industry which will result after the war, all countries will need every available man, and it becomes the duty of belligerent nations to return to civil life all their soldiers as nearly 100 percent efficient as possible. This applies naturally, most particularly, to the vast army of crippled soldiers.

What, then, has been done to make the crippled soldier econom-

*Read at the Kansas Home Service Conference of the American Red Cross at Topeka, Kansas, June 10, 1918.

ically efficient; and how have the belligerent nations undertaken to solve this problem? By *reconstruction* and by *reeducation*. In describing reconstruction I shall follow closely the methods and experiences of England on account of the excellent work done by Sir Robert Jones. In the ideal arrangement the soldier, wounded in such a way that he may eventually become crippled, is sent directly to an orthopedic hospital, where appropriate treatment can be immediately commenced. In practice, however, the wounded soldier usually goes from one hospital to another, and finally reaches the orthopedic hospital, after months of suppuration, with stiff joints; or fractures healed, possibly, in bad position; or, even with limbs needlessly amputated, ready then to be literally reconstructed.



Fig. 1.—A view of the artificial limb department, Red Cross Institute for Crippled and Disabled Men.

Under these circumstances the work of reconstruction is, of necessity, slow. Short legs must be lengthened, stiff joints must be mobilized, nerves which have been shot away must be united, or the section destroyed must be replaced, joints made flail by the destruction of tendons must be stabilized by the transfer of tendons or be made stiff. Amputated limbs must have the stump prepared for the artificial limb, and, if the joints above the stump are stiff, these must be mobilized. Joints stiffened in bad positions must be corrected. These may take several operations and a long period of convalescence.

Fortunately the advances in the treatment of infection have been great, and have resulted in the saving of many limbs that other-

wise would have been amputated in order to save life. Sir Robert Jones tells us: "The surgeon has an opportunity to think in terms of function, and is not forced to think in terms of merely saving life. Although amputations for shattered limbs are sometimes inevitable, and often save life, their number is constantly being lessened by the improvement of our armamentarium. The surgeon is



Fig. 2.—The Provincial Institute of Technology and Art at Calgary, Alta., has been turned over entirely to the retraining of returned soldiers. This picture shows the class in gas engine and automobile mechanics having a lesson on static electricity.



Fig. 3.—Two men who took the course in automobile mechanics at the Provincial Institute of Technology and Art at Calgary, have reenlisted in the motor transport, one as a sergeant in charge of the repair work. These men suffered from abdominal wounds, and, while skillful surgery resulted in a very satisfactory recovery, they never will be able to do heavy work again.

no longer dominated by gas gangrene and by sepsis, but can turn his thoughts to the avenue which leads to reconstruction. Given the knowledge, he has the power to prevent a limb from becoming deformed and disorganized, and this makes for an early recovery by a short in place of a devious, painful, and prolonged route. Before long we shall doubtless see the disappearance from our ortho-

pedic centers of the more grave and crippling conditions which have been so numerous in the past."

"This advance in surgery at the front has enabled the war office to have cases conveyed directly from the front to the orthopedic centers, or to other hospitals especially equipped for their treatment, without the delay inevitable in the past. This means a great



Fig. 4.—The chemistry of gases and of electric batteries is a part of the course in automobile and gas engine mechanics at the Provincial Institute of Technology and Art at Calgary.



Fig. 5.—Classes in typewriting and stenography are popular with men whose disabilities are such they are unable to stand any sort of outdoor exposure. One young man suffering from chronic bronchitis due to exposure in the trenches received instruction in bookkeeping, stenography, and typewriting, and now has a position in the Dominion Forestry Department at a salary of \$100 a month.

deal to the orthopedic surgeon. He may now get his cases before deformity has taken place, or at a stage when it is quite easily corrected. The problems he will have to deal with are comparatively simple. If the limb is short, it can be lengthened without an operation. If it is crooked, it can be molded straight. Months of suppuration have not ankylosed his joints, which can at once be placed in correct positions. The soldier's period of suffering is

greatly shortened, and he is discharged to fight or work with the least possible delay."

That these predictions are correct is shown by statistics from one of Sir Robert Jones' hospitals, from which, out of 1,350 cases treated in one year, 997 were returned fit for the army. Massage, electricity, hydro- and mechanotherapy are essential to the proper work of reconstruction, and are often the most important. "The orthopedic surgeon who sutures a nerve or transplants a tendon



Fig. 6.—Both arms gone, but prepared by working prostheses to return to his farm.

must afterward exercise every art he knows to see that that function is secured."

To secure function in a stiff joint, motion of the joint is necessary. In the early days of the war this was obtained by putting the limb in an apparatus which mechanically moved the joint, or, if the hand were stiff, the patient would try to grasp a spring dumbbell. This work was terribly dull and monotonous, the patient soon wearied of it, and much of the benefit was lost. Possibly the whole routine of treatment would consume an hour or so a day, and the rest of the time the patients devoted to nursing their arms

or legs. As a result a mental apathy existed which was not neutralized by the eternal cigarette or noisy graphophone. Naturally the speed and amount of improvement were not commensurate with the amount of time and work expended.

To counteract this mental state the plan of occupational therapy was devised. The theory is that, instead of putting a patient in some form of apparatus and allowing it to move his joints for a certain period every day, he is given some form of work which will accomplish the same result. Instead of constantly thinking of the joint that is to be moved, the patient thinks of the work he is doing and forgets about his disability, and improvement rapidly takes place. A man with a stiff ankle is put to work on a fret saw, and he unconsciously uses his ankle while interested in his work, or he may be set to planing or sawing wood. If he has a stiff hand, instead of grasping a dumbbell, he may be given a dustswab or a paint brush, and so on.

The treatment is not only useful in increasing the function of the disabled joint, but it has been found to exert a powerful influence on the mental aspect of the disabled soldier. He feels that he is doing something useful, his ambition is stimulated, and he no longer considers himself a useless cripple.

The mental state of many of the men was bad. They had spent many months in the hospitals. "They were 'fed-up,' discontented, full of revolt, despairing of their future." In England these men could not be compelled to work, but had to be persuaded. It was soon found that, when they had been converted, their whole mental attitude changed.

In addition to the types of work already mentioned, there were shops in which braces, splints, artificial limbs, and other forms of apparatus and hospital supplies were made. Here also the men who are waiting for artificial limbs, or who are learning to use them, are employed and trained.

In this country, in addition to the regular therapeutic workshop, occupational therapy is to be used in the wards, where the men are taught basquetry, weaving, on small looms which fit on the beds, knitting, wood carving, typewriting, and other similar occupations. Thus early the men are taught the value of work, and are helped both mentally and physically.

In the reconstruction period, work is used mainly for its curative value. It may have commercial value or it may not. When the patient has reached a stage in his treatment where he is ready to be discharged, as nearly perfect as possible, then the problem of fitting him for life as a civilian is reached, and the work of reconstruction merges into the work of reeducation.

Reeducation, or vocational training, was first established, shortly after the war, at Lyons, France, by M. Edward Herriott, the mayor

of that city. The school is now the Ecole Joffre. It was put under the charge of M. Azar Basèque, who had been the director of the school for industrial cripples at Charleroi, Belgium, up to its destruction by the Germans. M. Herriott's idea was to utilize the returned wounded soldiers to supply the pressing need for labor in his locality.

At present all the belligerent countries have adopted this plan of reeducation, and it has become one of the most important problems of the war. By it the crippled soldier is reeducated along the lines of the trade that he followed before the war, or, if the condition of his injury is such that he cannot follow his former trade, he is



Fig. 7.—One-armed instructor and his one-armed pupils in mechanical drafting.

taught a new one. Reeducation aims to make all the returned soldiers as nearly economically independent as possible. Our knowledge of reeducational work is based mainly on what has been done in the other belligerent countries. Our work is just in preparation. Though the work itself is very similar in all countries, the method of administration is somewhat different.

In vocational training, as in reconstruction, the mental attitude of the soldier plays an important role. Most of the men are sick of war and its hardships. The suffering and tedium of their hospital stay is still very fresh on their minds, and their one desire is rest and peace. They long for their family and the society of their friends. They are not interested in reeducation because they fear the prolonged separation from their homes that it may entail. This desire for home is also often fostered by the expressed sympathy of their family, who are anxious to have the crippled hero with them.

Unfortunately misdirected public sympathy also helps, as the men are regarded as heroes, and all sorts of entertainments and fetes are gotten up for them. One English woman complained that her husband would not spend any time with her or the children. She had wanted him that afternoon to accompany them to the park, but he disdainfully refused, saying he was going for an automobile ride and later to a sing-song at one of the fashionable hotels, which was being provided by the society women of that city. So mother and children went to the park alone, while the hero was receiving appropriate recognition of his services. He may also feel that, having sacrificed himself to his country, he should be taken care of for the rest of his life. Abroad many of the men feared that, if their earning power was increased, their pensions would be decreased, and so were loath to take up reeducation. This has been changed, however, and a man's pension now depends on his injury, not on his earning capacity.

When many millions of men are at war, there is a demand for almost any sort of labor, and sympathy also supplies many a position. These often pay good wages, and the crippled soldier does not see why he should waste his time being reeducated when he has a good job, possibly in a munition factory, or even an easy job such as a watchman, waiting for him. He does not realize that after the war the handicapped will have a hard battle to fight, and that the chances are he will gradually go from bad to worse until he finally becomes a public charge. He must be shown, through tact and kindness, that, though a disabled man may be prevented by his handicap from returning to the occupation in which he was previously employed, even the most seriously crippled can be trained for other trades at which they can earn the full standard wage. With this training, cripples will no longer be regarded as helpless, but able.

Sir Robert Jones says: "I know the wounded soldier well. He is like a great school boy, and with tact and sympathy he can be led by a silken cord. A host of influences should be directed on him on his discharge—sympathetic, explanatory, and persuasive. Facts should be brought to bear on him, before and after his discharge, to make him familiar with the potentialities of a wounded man. A man, howsoever injured, if he has found an outlet for his productive energies, is no longer a cripple. He becomes transfigured. From noble sacrifices abroad he returns to serve his country at home. We must realize the mentality of our wounded, who are war weary and sick unto death of hospital life. 'From hospital to industry' should be their aim. They should be pulled back from the blind allies of labor. Unless this is done, a great tragedy will occur when the war ends, and the wounded soldier is displaced by a more competent worker."

In France and England everything is done to show the wounded soldiers the advantages of reeducation. Posters are put everywhere—they are told of the work. In England a pamphlet is published describing the reeducational work and telling of the advantages. Most important, it contains letters from disabled soldiers and sailors telling of their experiences. One man writes: "I had already been in the Royal Marines nine years when the war broke out. We went to the Mediterranean and then to Gallipoli,



Fig. 8.—A soldier with right arm amputated who has been fitted with an appliance which permits him to use the scythe, etc.

where I was badly wounded and lost my right leg (very high amputation). My previous occupation having been that of a gardener, I began to wonder what I should do. I then joined a special course of electrical work while in the hospital and went to a training center after leaving, and got on so well that I got a good job at the C. A. V. Magneto Works, where I am doing very well. The work I have to do suits me, as I sit down at it. I would advise everyone who cannot go back to his old job to learn a trade. I am earning

more now than I did before I joined up, apart altogether from my pension."

It is also most important to educate the public not to regard the disabled soldier as a hopeless cripple, but as an economic unit, able to take his place in the battle in life, and, by being efficient in his line, earn a good living wage.

In France the work of reeducation was at first taken up by various private agencies and societies, municipalities, provincial governments, and the various departments of the central government, and as yet has not been completely coordinated. The crippled soldier, before his discharge, is sent to an orthopedic center and is compelled to take up reeducation, but as soon as he has been discharged from the army this requirement ceases, and his further training is voluntary. A law has recently been passed by which every discharged soldier may demand reeducation. There are many centers for reeducation and a number of methods by which it is taught. There are schools where the soldier lives at home or boards in the town, and schools with barracks attached. There are a number of places where the men are apprenticed to various industries, and they either live at barracks or are quartered in the town. The men are allowed pensions and allowances while at the school, and after they have finished their work a committee is charged with the duty of securing situations for them. They also have first choice in certain governmental positions and industries that have received grants from the Government. Reeducation and the return of men to civil employment is under the Office National des Mutilés et Réformés de la Guerre.

In England reeducation is under the minister of pensions, and working under the ministry are several committees. One looks after the employment of the men, one prevents friction between capital and labor, and there are advisory trade boards. The work of reeducation is carried on in the orthopedic hospitals and in technical institutes, trade schools. Private institutes also cooperate in the work.

In Canada the work has been most definitely coordinated and is under the direction of the Military Hospitals Commission. The work of this commission falls under three headings:

1. The provision of convalescent hospitals and homes in different parts of the Dominion.
2. The provision of vocational training for those who, through their disability incurred in active service, would be unable to follow their previous occupations.
3. The establishment of the necessary machinery for the provision of employment for those who require vocational training, and for those who will need such training during and at the conclusion of the war.

In the United States reconstruction is under the medical branches of the army and navy. The Federal Board of Vocational Education has charge of the reeducation. A bill for vocational reeducation is now before Congress. It provides that a wounded soldier who is unable to follow his previous occupation and who may be reeducated "shall be ordered by the Bureau of War Risk Insurance to follow such course of vocational rehabilitation as the Federal Board for Vocational Education shall prescribe and provide, or,



Fig. 9.—Soldier with double forearm amputation working with a spade. Right arm with single hook, left arm with ring hook "Aubut."

when deemed advisable, by said board shall be retained in the military or naval forces of the United States, detailed to the control and direction of said board until the course of training prescribed has been satisfactorily completed."¹ It also provides that, if a soldier willfully fails in the course prescribed, the Insurance Board may withhold any part of or all the monthly compensation due such person and not subject to compulsory allotment. While in

¹Since this was written the compulsory requirement has been removed.

training, the soldier is to receive monthly compensation equal to the amount of his monthly pay for the last month of his active service.

The board is to cooperate with the army and navy, with the Secretary of Labor, and, at its discretion, may cooperate with public or private agencies. It shall also see that, as far as practical, vocational therapy shall be combined with occupational therapy. The board may also accept unconditional donations. The board, for vocational education, has begun to select teachers for this work, and has outlined a comprehensive course of study.

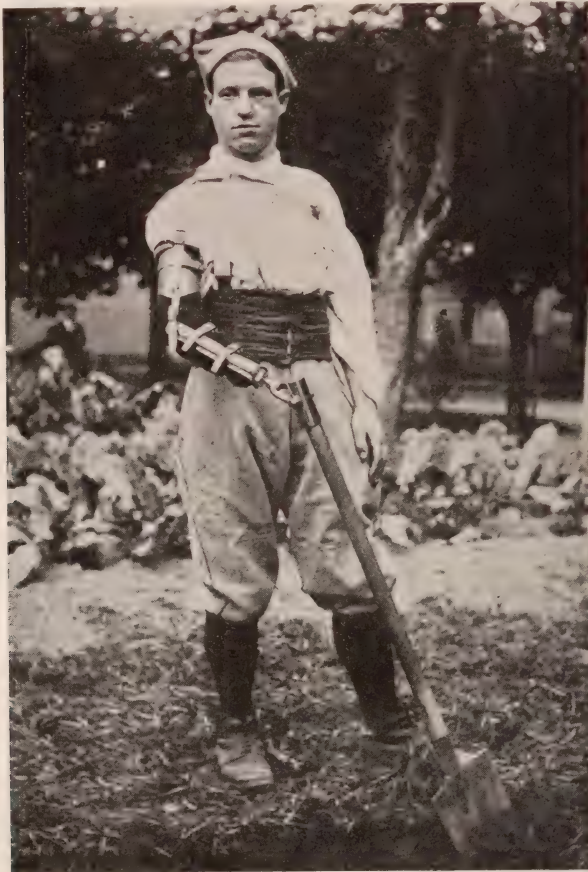


Fig. 10.—French soldier fitted with a prosthetic appliance which enables him to use the spade and other agricultural implements.

In reeducating the disabled soldier the following points must be considered.

1. Work should begin as soon as is consistent with his physical condition. If work, even of a lighter sort, can be begun early, the mental outlook is improved and the cooperation of the soldier is more easily secured.

2. The occupation selected must be suited for the patient, and

should be as similar to his previous work as possible. As an example, a competent bricklayer who has lost a leg may, after a thorough course in architectural drafting and the interpretation of plans, become a job foreman or an inspector of construction; a farmer to run a tractor, or a railroad brakeman can learn telegraphy.

3. The trades taught must be thorough, because, if inferior workmen are turned out, the whole plan will be discredited.

4. The trades that are taught should be those in which the local employment possibilities are good, and in which there is a definite demand for a greater number of skilled operatives; that they be no seasonal trades, that they be growing, rather than on the wane, and that the wage standards be satisfactory.

5. The instructor must be thorough, patient, and sympathetic with the crippled soldier's point of view.

6. The schools should be distributed throughout the country, and the courses taught should correspond to the industries of that locality. In a manufacturing community, trades should be taught, and in an industrial community, agriculture, and allied occupations should be specialized in.

7. The soldier should be sent to a school as near his home as possible, so that he may have the benefit of the training of that neighborhood, and be as near his family as possible.

8. While undergoing reeducation the crippled soldier should be under careful supervision, both as to his work and his surroundings. He should be protected from the many temptations to which he is subjected.

9. And, most important, employment bureaus must be established so that the man who has been reeducated can be placed in good employment, with a wage commensurate with his ability. He must be safeguarded from exploitation on account of his disability.

In addition to the trades, bookkeeping, draughting, typewriting, and similar occupations are also taught, and, when necessary, primary education must be given. An endless variety of occupations is taught. In all the countries cobbling is very popular. The question has been raised whether there may not be so many cobblers that there will not be employment for all. Electrical engineering is also popular, also the manufacturing of electric supplies and automobile mechanics.

This covers, in general, the after-care of the crippled soldier. I have tried to point out not only some of the actual treatment, but also some of the underlying principles which I think are necessary for an understanding of the subject.

But what can we do to help? What can the home service worker in the Red Cross do? You can all help. Reeducation must have publicity—the public must know and understand what it means.

Every man, woman, and child must be told how they can aid the crippled soldier on his return from the war; and you, as workers and citizens, must help disseminate this information. There is no place for maudlin sentimentality. The crippled soldier must be made to feel that, though he may be a hero, he is a man, and, though disabled, he can still work and earn a good wage—not given as a charity, but because he is worthy of his hire.

Public opinion has regarded a crippled man as helpless, and he has always found it difficult to get employment. The employer must be educated. He must be shown that the disabled man who has been reeducated is just as valuable as the sound man. Cooperation of labor unions must be secured. The public must be taught that a cripple is not a strange or amusing thing, but that an amputation or other deformity in a working man is a badge of honor, and in a loafer is a badge of shame.

As social workers you should begin now to educate the families of soldiers to expect their men to be reeducated if crippled, and, if that time should ever come, to show them that their family expects it as a matter of course, and as a duty they owe to their family and the country. As a social worker you will know home conditions, and, when the time comes, you can give valuable suggestions on the best occupation to take up.

Now is the time to begin this work. Pamphlets are sent from the Red Cross Institute for Crippled and Disabled Men. Public sentiment must expect reeducation, and the returned soldier must feel that he is expected by the public and his friends to be reeducated. He must demand reeducation as a right.

Our lessons in war reeducation have taught us that civil hospitals will have to be prepared after the war for reconstruction. The industrial cripple will justly demand vocational training, and may well expect to be returned to work, able to earn as good a wage as, or better than, before he was injured. I firmly believe that, after this war, hopeless cripples will be a thing of the past.

SELF-GOVERNMENT FOR THE RESIDENT MEDICAL STAFF.

A Plan Introduced at New York City Hospital—Trend of the Time Toward Democracy in Educational Institutions as Elsewhere —First Attempt to Introduce Self-Government Into the Hospital.

BY CHARLES B. BACON, M.D.,

Medical Superintendent New York City Hospital, Department of Public Charities,
New York City.

The medical service of the modern hospital is not only a place for fitting young men recently graduated from our medical colleges to care properly for the sick—it is also an educational institution. At the termination of an internship these men go forth to engage in the activities of life with a personal responsibility, each one acting his part in the many medical, social, and economic problems, each an honored member of a noble profession. In order best to meet these obligations, young men need to have placed on them, during the years of preparation for life service, responsibilities associated with their training and experience. Self-government, as it appears to me, has a practical application in its relation to young men—I might say, equally so to young women—and I predict that a modified form of self-government will in the near future be introduced in many of our hospitals and schools of nursing.

Self-government, as applied to student bodies, has for many years been in successful operation in many of our leading universities, colleges, and schools. In certain educational institutions well known to me it is regarded by the faculty and student body as practical and fundamentally correct, receiving mutual approval. Some months ago, my interest having become quickened on this subject, and a question arising affecting somewhat unusually the conduct and discipline of our intern staff, I asked myself, "Why is not a modified plan of student self-government practical in its application to the members of the intern staff?" A large portion of our interns have an academic, as well as a professional, degree. Furthermore, their academic and professional studies have been pursued in educational institutions where self-government is already in operation.

FIRST INTRODUCED AT CITY HOSPITAL.

So far as I know, this is the first effort to introduce self-government as it relates to the intern staff of hospitals. I decided that

it might well be imitated at this hospital. Accordingly the plan was experimentally placed in operation approximately one year ago. So acceptable and satisfactory was this plan that it recently, at my request, received the official approval of Commissioner Wright.

I conceive it to be the duty of every administrative officer, whether he or she is charged with the responsibility of directing the affairs of a hospital or school of nursing, ever to keep in mind that the status of the intern has changed, as well as the spirit of the age, since we were interns. Furthermore, the whole world is turning toward democracy. I am quite familiar with what has been said concerning interns during the past twenty years regarding their habits of conduct, welfare, discipline, their relations to the various officers of the hospital and school of nursing, the attending staff, the patients, and the public. For the greater part, nearly all one reads and hears on this subject indicates that interns require close supervision and have a veritable will to violate established rules. I have long since concluded that members of all professions dislike rules, and rules established for disciplinary measures are, to say the least, unwelcome.

To the medical administrative officer is given an unusual and special privilege of relating himself most intimately with the members of the intern staff. This relationship should be one of advice and helpfulness, as well as corrective. For twenty years my work has been thus intimately associated with medical students and recent graduates, not only as a medical administrative officer, but also for seven years as instructor and lecturer at the Long Island Medical College, also beside teaching the in wards of the Kings County Hospital. I appreciate that these men soon realize that the practice of medicine is a sacred art, a responsible calling, and requires the best they can give. Thus their habits of life, work, and play are measured by a scale of justice to all members of the hospital organization, and here let me say that an efficient organization and fraternal cooperation are fundamental requirements.

No member of the hospital family comes in such intimate touch with the intern as does the superintendent. Our interns receive appointments following competitive examination, conducted usually in February, and serve as junior, senior, assistant house, and house officer for a period of two years. Prior to their entrance on duty they assemble in my office. This is my first opportunity to speak with them as regards their conduct, work, and welfare, as it relates to each and to one another, and to the entire hospital family. From this moment they are made to feel that they are officers of the hospital and members of our family, that each member bears a definite relationship and position in our hospital organization. In this cordial, helpful, and mutual relationship it is possible for all to live and work.

Honor appeals to all. This has always been impressed on me from early boyhood days. I expect that a modified form of self-government, based on the honor system, will be the next forward step in our professional administration, particularly as it relates to the resident professional members, whether students, doctors, or nurses. It may not be advisable to adopt this plan in toto at once. Preparation must be made, and the plan acceptable to all. Conferences with the house staff and their cooperation are vital in preparing the way and adopting the plan. This is always necessary whenever a change is to be made. We did not launch forth on this plan without devoting ample time and consideration to it. From the very beginning we received encouraging support. At our final conference, when a vote was taken, it was unanimously and enthusiastically approved, each and every member pledging his loyal support. Throughout the consideration of this plan I was encouraged by the support and cooperation accorded by Commissioner John A. Kingsbury, First Deputy Commissioner Henry C. Wright, and Mr. Lyman Beecher Stowe, secretary of the department. Their helpfulness, together with the splendid spirit of cooperation manifested by every member of the house staff in this and other matters of mutual benefit, is gratefully acknowledged. The preparation of our plan of self-government, its aim, constitution, and resolutions, received long and careful study, and will, I believe, serve as a guide and control in the conduct, work, and welfare of our intern staff.

I am pleased to present to the readers of THE INTERSTATE MEDICAL JOURNAL our plan of self-government.

PLAN OF SELF-GOVERNMENT.

Drafted by Dr. Charles B. Bacon, Medical Superintendent, and the Members of the House Staff, New York City Hospital, Department of Public Charities, New York City.

Thoroughly believing that a plan of self-government based on the honor system, and already in satisfactory operation in many of our leading universities, colleges, and schools, is fundamentally correct, and pledging ourselves to loyal obedience to such a plan, we enact and submit to the commission, Honorable John A. Kingsbury, and deputy commissioner, Honorable Henry C. Wright, the following aim, constitution, and resolutions governing the resident medical staff of the City Hospital.

AIM.

To observe those proprieties of conduct and courtesies in our relations to one another, to all officials of the hospital, the nurses, the patients, and the public, as shall preserve at all times the dignity of the house staff and the honorable standing of the hospital.

CONSTITUTION.

Article 1. The name of this association shall be "The Resident Medical Staff Association for Self-Government."

Article 2. The purpose of this association shall be the government of the intern staff.

Article 3. The association shall be composed of active and associate members. Active membership includes those having received a regular appointment; associate membership includes those serving as special assistants, substitutes, and pathological interns.

Article 4. Active members only shall be qualified to hold office in the association. However, associate as well as active members shall be entitled to vote.

Article 5. The medical superintendent, together with the chairman of the executive committee of the medical board, and the assistant resident physician, shall be ex-officio members. It shall be their duty to give counsel and advice. They shall attend meetings on invitation, also whenever matters of extraordinary or special importance arise.

Article 6. Section 1. The association shall have power to deal with all matters concerning the conduct and welfare of the staff members.

Section 2. The association shall have the power of inflicting penalties, to enforce its decision, even to the extent of recommending the expulsion of a member to the medical superintendent.

Article 7. The house staff shall hold meetings in the staff room, Janeway Hall, at least once a month.

Article 8. Section 1. The executive power of the association shall be vested in an executive committee of five members—one member to be elected from and by each division (house, assistant house, senior and junior)—and one shall be elected at large by the entire house staff. The medical superintendent, together with the chairman of the executive committee of the medical board, shall be members ex-officio.

Section 2. This committee shall elect a president, a vice-president, secretary and treasurer.

1. The duties of the president shall be to call together and preside over all meetings of the association and the executive committee.

2. The duties of the vice-president shall be to assume the duties of the president in his absence or at his request.

3. The duties of the secretary shall be to keep the minutes of the association and a list of the members, to post notices of the meetings, and to attend to the correspondence of the association.

4. The duties of the treasurer shall be to collect all dues and assessments established by the house staff. Disbursements of \$5 or over shall be made only on the recommendation of the house staff. Disbursements under \$5 may be made on the recommendation of the executive committee. The treasurer shall post on the bulletin board at Janeway Hall the amount due from each member, also on the first of every month a complete financial report.

Section 3. 1. The officers of the executive committee shall be semi-annually elected by ballot, by the association, on the 15th day of June and the 15th day of December (or on the following day, should this day fall on Sunday or holiday), and they shall enter on their duties immediately.

2. The executive committee shall bring to the attention of the house staff, assembled in session, any suggestion which shall have been brought to the attention of the committee by any member of the house staff, providing this suggestion receives a majority vote in affirmation at a meeting of the executive committee.

3. The executive committee shall take under consideration all matters relating to the conduct and welfare of the house staff.

4. The executive committee shall settle all differences arising between members of the house staff. Appeal from such decision may be made before the house staff in session. Until such decision shall have been appealed and acted

on by the house staff, the decision of the executive committee shall remain in force.

5. Any member of the executive committee may be impeached by a majority vote, and removed from office by a two-third vote of the assembled house staff. Election to office, created by such vacancy, shall be by and from the interested division in the event of a divisional represented vacancy, and by the assembled house staff in the event of a vacancy in the office of the representative at large.

Article 9. Section 1. The legislative power of the association shall be exercised by the whole house staff. One-third of the members shall constitute a quorum.

Section 2. A meeting of the association may be called at any time by the president, and must be called by him on the application of three members or the medical superintendent. Should the president be unable to call a meeting, it shall be called by the vice-president.

Section 3. The rule of a majority shall prevail in all meetings where a quorum of the association is present.

Article 10. Section 1. The judicial power of the association shall be vested in (1) the association, sitting as a judicial body—this body shall constitute the highest court, wherein the rule of the majority, consisting of two-thirds of the members of the association, shall prevail—and (2) the executive power, constituting the lower court, before which all matters must first be brought, and from which an appeal may be made to the whole association, sitting as a judicial body.

Section 2. In extraordinary cases, before a decision has been reached, the association, sitting as a judicial body, at the request of the executive committee sitting as a judicial body, and on an affirmative vote of two-thirds of the members of the association, may delegate its supreme jurisdiction to a special court, consisting of the executive committee, the medical superintendent, and the chairman of the executive committee of the medical board. The latter two members shall, if deemed by them advisable, present the matter, for final and official action, to the commissioner.

RESOLUTIONS.

Relating to the Resident Medical Staff Plan of Self-Government.

1. Resolved, that the constitution and resolutions of the association be semi-annually read aloud by the secretary to the members of the association—once during the month of June, again during the month of December.

2. Resolved, that two days previous to any meeting of the association a notice of said meeting be posted on the house staff bulletin board at Janeway Hall, and twenty-four hours previous to the meeting a complete list of subjects to be discussed be likewise posted. In cases requiring immediate or private action this regulation may be set aside by the president.

3. Resolved, that the executive committee, sitting as a court, be empowered to require testimony from any member of the association.

4. Resolved, that members of the house staff shall register their name, date, time of departure, time returned, together with name of substitute, in the house staff time book to be found at the hospital in the bureau of information.

5. Resolved, that we declare our intention and will to strictly obey all rules heretofore promulgated, or that may be promulgated by the commissioner, affecting the conduct and welfare of the house staff.

6. Resolved, that each member of the house staff shall be provided with a copy of the constitution and resolutions.

7. Resolved, that application for leave of absence shall be submitted to the medical superintendent on the regular form for this purpose. This shall be permanently filed.

8. Resolved, that no member of the house staff shall entertain visitors without having first secured the consent of the medical superintendent.

9. Resolved, that the executive committee shall exercise supervision over the residence of the intern staff, the rooms, hallways, bathroom, staffroom, and library. This committee shall endeavor to see that the house rules are carefully observed by all members, such as punctuality to meals, visitors to the home, quiet, etc.

10. Resolved, that the house staff service schedule shall be tentatively prepared by the assistant resident physician for the consideration and approval of the house officers not later than the evening of the twenty-fifth of the month. When agreed on, the schedule shall be posted on the bulletin board at Janeway Hall for the attention of the association, and shall be delivered to the medical superintendent for his approval and typing not later than noon of the last day of the month.

AMENDMENTS.

This constitution and these resolutions may be amended or added to at any regular meeting of the association assembled in session by a two-third vote.

HOSPITAL AND MEDICAL TREATMENT OF INJURED CIVIL EMPLOYEES OF THE UNITED STATES.

By JOHN W. TRASK,

Surgeon U. S. P. H. S., Medical Officer U. S. Employees' Compensation Commission,
Washington, D. C.

There was passed by Congress and approved by the President, September 7, 1916, a law entitled "An Act to Provide Compensation for Employees of the United States Suffering Injuries While in the Performance of Their Duties and for Other Purposes." The law provides for compensation in case of personal injury sustained by employees while in the performance of duty. If the disability for work is of longer duration than three days, compensation is paid for loss of wages. For an injury sustained by an employee in the performance of duty, and whether or not there is any loss of time from work, the employee is entitled by the terms of the law to receive "reasonable medical, surgical, and hospital service and supplies."

For the purpose of the administration of the act, the law created a commission composed of three members and known as the United States Employees' Compensation Commission. The members of the commission are Mrs. Frances C. Axtell, chairman, R. M. Little, and John J. Keegan, and the office of the commission is located in Washington.

The fundamental purpose of the law is to repair, in so far as is possible, the damage imposed upon employees by the hazards of industry, to restore injured employees to industry unimpaired where this can be done, and to compensate employees in part for such loss of earning capacity as results from injury. Much of the work of the commission is therefore a question of medical, surgical, and hospital treatment.

The responsibility of the commission under the law may be construed as not only that of furnishing to the employee medical and hospital treatment, but that of furnishing, so far as it is available, that treatment which will be the most effectual in repairing the damage due to injury and in restoring the employee to industry.

The law provides that medical and hospital treatment shall be furnished where practicable by United States medical officers and hospitals, but that, where United States medical officers and hospitals are not available, treatment shall be furnished by private physicians and hospitals designated for the purpose by the commission.

Section 9 of the law, which is the principal one relating to this aspect of the subject, is as follows:

"Section 9. That immediately after an injury sustained by an employee while in the performance of his duty, whether or not disability has arisen, and for a reasonable time thereafter, the United States shall furnish to such employee reasonable medical, surgical, and hospital services and supplies unless he refuses to accept them. Such services and supplies shall be furnished by United States medical officers and hospitals, but where this is not practicable shall be furnished by private physicians and hospitals designated or approved by the commissions and paid for from the employees' compensation fund. If necessary for the securing of proper medical, surgical, and hospital treatment, the employee, in the discretion of the commission, may be furnished transportation at the expense of the employees' compensation fund."

The problem of arranging for adequate and competent medical and hospital treatment is not a simple one. Civil employees of the United States are at work in all parts of the country, even to the smallest hamlet which has its post-office. Not only this, but there are also the field parties doing work in uninhabited or sparsely settled localities, far removed oftentimes from any hospital and frequently even from any physician. The work of civil employees varies from construction work in the building of powder plants and shipyards, and the varied manufacturing work of arsenals and navy yards, to the work of clerks in the departments at Washington, the post-office employees throughout the country, including letter-carriers and those serving rural routes, those engaged in the various activities of the Department of Agriculture, including field parties and forest rangers, and those engaged on projects of the Reclamation Service.

The commission was not organized for some time after the enactment of the law. It is now engaged in extending its arrangements throughout the country for furnishing adequate medical and hospital treatment for injured employees. It is endeavoring to make arrangements where possible with well-equipped, well managed hospitals, hospitals of such standing that there can be no question but that injured employees will receive adequate treatment. The arrangements are being made with hospitals wherever possible instead of with physicians, because the hospital, in addition to furnishing hospital housing and nursing facilities, makes available a group of specialists, a group of men competent to handle injuries of all kinds, injuries requiring the orthopedist, the surgeon, the ophthalmologist, the roentgenologist, and the internist. In localities where there are no satisfactory hospitals, arrangements will be made with one or more physicians in each locality, preferably physicians having some experience in surgery, or particularly with that class of accidents and injuries which constitute much of the work of what we have come to term the industrial surgeon. The commission feels that, in the interests of the employee and because of its responsi-

bilities, its arrangements with hospitals and physicians must be of such a nature that there can be no question of their competency or adequacy. It feels that it should and can, on the whole, place at the disposal of the injured employee better medical and hospital facilities, i. e., better in so far as their efficiency in the repairing of the injury is concerned, than the employee would usually be able to obtain if seeking treatment of his own initiative and at his own expense.

Medical and hospital services are necessarily of such an unstandardized nature that the question of going into the market and purchasing these commodities is one possessed of difficulty. The commission presumably can pay for what is necessary or essential for the recovery of the employee, but is not justified in paying for things unessential to such recovery, nor is it justified in paying the prices for work that are often obtained by specialists of wide repute—prices that from the point of view of the specialist are entirely justified in that he, in many instances, can occupy his time fully with those able and willing to pay his charges. On the other hand, the commission cannot accept gratuitous service. The work of the commission is not charity, nor are the injured employees in any way charity patients. Their treatment is a right established by the law of the land. The charges, so far as hospitals are concerned, need be associated with little difficulty. A hospital can readily ascertain what it costs it to care for patients. Every hospital knows its cost per patient per day. Most hospitals know the general cost per patient per day and also the cost per room patient per day and per ward patient per day. It is a simple matter, therefore, for hospitals to establish a "cost plus" basis for charges.

The law provides that treatment of injured employees shall be furnished by United States medical officers and hospitals wherever these are available. The principal medical officers and hospitals available for this work are the hospitals and medical officers of the United States Public Health Service. These are located, chiefly, in the seaports and lake and river ports. In other localities special provision has to be made and, as provided by the law, physicians or hospitals designated for the purpose.

The commission has been sending to general hospitals a letter and schedule, copies of which are shown herewith. The purpose of sending these is to ascertain what hospitals are willing to care for injured civil employees and what their respective facilities are. With the information thus furnished it will be possible to designate hospitals where available pursuant to Section 9 of the Compensation Act. In this work material assistance has been rendered by Maj. W. H. Walsh, M. O. R. C., secretary of the American Hospital Association, and by the Medical Section of the Council of National Defense through Dr. Robert L. Dickinson.

If any hospital which feels that it is suitably equipped to furnish adequate treatment such as is desired fails to receive such a schedule, one can be obtained by making request to the Employees' Compensation Commission, Washington, D. C.

COPY OF LETTER SENT OUT BY THE UNITED STATES EMPLOYEES' COMPENSATION COMMISSION.

"The Federal Compensation Act of September 7, 1916, provides that civil employees of the United States injured while in the performance of duty shall be given medical, surgical, and hospital treatment. See Section 9 of the Act, copy of which is inclosed herewith.

"The responsibility of furnishing this treatment falls upon this Commission. The Commission feels under obligation not only to furnish treatment, but, in the interest of the employee, to furnish that treatment which will best restore him to his former efficiency. For this reason it is found advisable to become acquainted with the management and facilities of one or more hospitals in each locality where there is any considerable number of Government employees to which injured employees may be sent.

"If you will be willing to have injured employees entitled to treatment under the Federal Employees' Compensation Act cared for in your hospital, will you please fill out the inclosed schedule and return it to this Commission.

"It will be noted that the schedule provided for the statement of charges contains paragraphs Nos. 1 and 1A for statement of charges for hospital patients. A rate covering the items included in paragraph No. 1 is preferred by the Commission, if it can be given. Paragraph No. 1A is provided as an alternative, in case the hospital finds it impracticable to give a rate as provided in paragraph No. 1.

"Injured employees are to be quartered in the general hospital wards. These patients are in no wise charity patients, but according to Act of Congress are entitled to reasonable medical, surgical, and hospital service to be paid for from a fund provided for the purpose. It is suggested that charges based upon the general hospital cost per patient per day would be reasonable.

"It is assumed that the charges for medical and surgical service will not be greater than would be charged patients of a similar economic status who were paying for their own treatment."

HOSPITAL SCHEDULE.

For the period ending June 30, 1919.

To be returned to the United States Employees' Compensation Commission,

Washington, D. C.

The Hospital,
located at.....in the
city of....., state of.....,
will furnish hospital service to injured civil employees of the United States
presenting credentials showing that they are beneficiaries of the Federal Em-
ployees' Compensation Act.

INFORMATION REGARDING HOSPITAL.

Are the general wards used exclusively for charity patients?.....
Are the general wards used in part for charity patients?.....
Can injured employees be cared for in the general ward?.....
Can medical and surgical treatment be furnished by the hospital?.....

If medical and surgical treatment can be furnished by the hospitals, by whom will this be given? Will it be given by the visiting staff or resident physician?

Can the hospital furnish out-patient or dispensary treatment to injured employees not requiring residence in hospitals?

What is the capacity of the hospital? Number of beds?

What special facilities or equipment, if any, has the hospital?

Has the hospital the following services: Medical?

Surgical?; Orthopedic?; Ophthalmological?

Neurological?; Contagious?

Has the hospital a clinical laboratory?

Is there a trained pathologist in charge?

Are case records kept of all hospital patients?

Of dispensary patients?

Has the hospital an x-ray department?

Is there a trained roentgenologist in charge?

Has the hospital interns? How many?

Has the hospital paid resident physicians or surgeons?

Has the hospital an out-patient or dispensary department?

Is it open daily? What hours is it open?

Is its use limited to "free" patients?

If the hospital publishes an annual report, please mail copy under the enclosed frank.

CHARGES FOR CARE OF INJURED GOVERNMENT EMPLOYEES.

Hospital service in general ward, including (1) subsistence, nursing, necessary medicines, dressings, laboratory examinations, (2) when necessary x-ray examinations, ambulance service and the use of the operating room, and (3) the furnishing of copies or abstracts of case records when desired by the commission, at \$..... per day.

Hospital service in the general ward to include.....

..... at \$.....per day.

Medical and surgical treatment for hospital patients, at \$..... per day.

This treatment will be furnished by.....per visit.

Out-patient or dispensary treatment, including all necessary medicines and dressings, at \$..... per visit.

Medical and surgical treatment for dispensary or out-patients, at \$..... per visit.

This treatment will be furnished by.....

Signature.....

Title of person signing.

Date,.....

THE SOCIAL WORK OF THE AMERICAN RED CROSS IN FRANCE.*

BY DR. MÉRY,

Professeur Agrégé at the Faculty of Medicine of Paris.

On its arrival in France in June, 1917, the American Red Cross set before it three aims: (1) to serve the American army, (2) to look after the sick and wounded of the allied armies, (3) to aid with all the means at its disposal the French and Belgian civil population. It is the considerable work accomplished under this last head that I wish to resume rapidly.

The Department of Civil Affairs of the American Red Cross has for its director Mr. S. H. Folks, with Mr. Walter Abbott as associate director. It is divided into several bureaus, such as the bureau of refugees, of reconstruction and relief, of reeducation of cripples, of the American Society of Friends. But the two sections which interest us the most are the antituberculosis bureau, directed by Drs. White and Miller, and that for the relief of children and for the reduction of infantile mortality, at the head of which is Dr. Palmer Lucas, of San Francisco.

The American Red Cross arrived on June 12, 1917, and entered into active work on July 24. The expenditure from July 24 to October 31, 1917, amounted to over \$2,500,000. The budget estimates an expenditure of over \$8,000,000 for the six months commencing November 1, 1917. There are about 1,000 workers—physicians, nurses, assistant nurses, and members of the Society of Friends.

The Red Cross has, for the most part, cooperated with other organizations, French or American, already established, such as the Society of Friends and the American Clearing House. In the matter of tuberculosis a good deal of work had already been accomplished by the Commission of the Rockefeller Foundation, under the presidency of Dr. Farrand, with the collaboration of Drs. Alexander Miller, H. Folks, and M. Gunn. Up to November 5, 13,708 children had been examined, and 376 had been hospitalized on account of acute or infectious diseases. Near Lyons a children's convalescent hospital had been installed, and also one for repatriated sufferers from tuberculosis.

The Red Cross sent delegates to accompany the convoys of refugees to the various districts to which these were allotted, and to

*Translated from *Paris Médical*, April 6, 1918. The original is illustrated with reproductions of postal cards of the Children's Bureau.

assist in their settlement. In this way at Paris this organization had found billets for 2,500 refugees. Other important activities were the establishment of schools for cripples and of agricultural centers, the reorganization of the farms of northern France, and, finally, the assistance given to war relief work already existing.

Children's Relief Work.—The Children's Bureau was established August 13, 1917, under the direction of Dr. Palmer Lucas. The asylum at Toul for the mothers and infants from the villages under gas bombardment was opened on July 28, and accommodates 466 persons. In a small hospital annex 234 children had received treatment up to November 1, 1917. The dispensary had treated 3,925 outpatients.

At Nancy Dr. Maynard Ladd established traveling dispensaries, visiting six communes each week and working in schools, factories, or municipal buildings. These had treated, up to November 16, 1,765 patients. At Lunéville had been organized a children's hospital of 20 beds, with a dispensary. At Nesle the medical needs of 1,200 children were provided by a small hospital and dispensary, with a traveling dispensary for seven villages of the region.

In addition to the work done at Evian, \$12,000 has been appropriated for the sending to Mediterranean sanatoriums of repatriated children suffering from glandular tuberculosis. The hospital for convalescent children at the Château des Halles, near Lyons, contained, at the time of writing, 40 patients, but there is provision for 200.

The Red Cross has shared with the Belgian Government the work of establishing a refuge for Belgian children in the monastery of the Carthusian Fathers at Glandier. This has accommodation for 1,000 children. In December this asylum sheltered 600 children under the care of a Red Cross staff. For this work there has been appropriated \$120,000.

At Chalons the organization has set up a dispensary, in connection with the maternity institute founded by the English Society of Friends, and another similar institution for women and infants at Nitry-le-François. At Paris four dispensaries for children have been opened in association with the work of the Rockefeller Foundation.

Antituberculosis Campaign.—The Red Cross succeeded to an organization founded for the tuberculous war victims, with a project for a sanatorium at Yerres and a considerable sum of money. It has founded or supported the following:

Hôpital Sainte Eugénie, near Lyons, with 220 beds, for the repatriated tuberculous. This hospital, opened December 5, held 50 patients in January. The material was supplied by the hospitals of Lyons, and the personnel is American.

Sanatorium Edward L. Trudeau, for 200 women or children.

Opened Christmas day at Plessis-Robinson, with the cooperation of the Society of Friends, it is offered for the duration of the war and six months after.

Sanatorium of Bligny. The completion of this building was effected by the support of the Red Cross, which has appropriated to it \$80,000. This provides 300 beds for tuberculous soldiers.

Sanatorium of Yerres. Will ultimately have 200 beds.

Hôpital Saint Joseph. This institution received \$57,000 to set up a sanatorium of 125 beds, with a dispensary.

In addition to these large donations to special institutions, generous financial help has been given to hospitals providing accommodation for the tuberculous.

Such, in sum, is an outline of the important direct activities during six months of the American Red Cross campaign against tuberculosis and infantile mortality.

No less important has been the indirect action, preparatory to the direct. These indirect activities are pursued along two lines: 1, the preparation and instruction of visiting nurses; 2, propaganda.

The education and special training of a large number of visiting nurses is an indispensable factor in the extension of measures against tuberculosis, and for the care of those suffering from that disease, as well as for the diminution of infantile mortality. With this in view a double system of training has been instituted. The

The education and special training of a large number of visiting nurses for the antituberculosis work. This teaching had already been initiated by Drs. Guinon, Kuess, and Rist. There are four schools—at the Leon Bourget Dispensary, at the training school of la Glacière, at the school of the Rue Vercingetorix, and at the Hôpital Bretonneau.

The other line of training, under the Children's Bureau, is conducted, in cooperation with the League against Infantile Mortality, at the Fondation Budin.

The campaign by propaganda, essential for popular education in social hygiene, and without which all those other efforts risk failure, has been undertaken in a systematic fashion by the Red Cross. A "Hygienic Center" has been established, having for its field of action the Department of Eure-et-Loir. The inauguration of the hygienic campaign took place on Sunday, January 6, 1918, at Chartres, in the Municipal theatre, under the presidency of the prefect of Eure-et-Loir, M. Borromée, supported by Dr. Farrand, of the Rockefeller Mission, and of Drs. Miller, Palmer Lucas, and Gunn.

After the speeches of the prefect and of Dr. Farrand, the campaign of popular education was there and then inaugurated by an address by Dr. Méry on the fight against infantile mortality and another by Mr. Antignat on the antituberculosis campaign. These were followed by projections showing proper methods for the care

of babies and various items of the antituberculosis fight. There were also distributed numerous intensively educational postal cards and simple tracts. There was also a small exposition of hygienic objects, such as cuspidors. The audience was large, as it also was at Dreux, where Dr. Léon Bernard gave a lecture on the work against tuberculosis. Similar lectures and demonstrations were given in all the important communes of the department.

In the first week at Chartres, at Dreux, and in nine important communes, 11,130 persons were present at such meetings. The work thus commenced was energetically extended to the other districts. Antituberculosis dispensaries have been founded at Chartres, Châteaudun, and at Dreux. The Red Cross has given \$4,000 for the families of discharged tuberculous soldiers in the Eure-et-Loir.

In the matter of the care of infants, lessons, simple in character, dealing with this matter, have been instituted in the girls' schools. A central nursery for infants separated from tuberculous families is to be set up in collaboration with the Grancher Work. This campaign by propaganda is not, however, limited to this one department.

The Red Cross has prepared a permanent exposition relating to the fight against tuberculosis and to all that concerns infantile hygiene. It will consist of a hall of exhibits, a lecture hall, and a cinematographic display. This exposition will visit successively all the great cities of France, commencing with Lyons, and will remain in each one month.

Such is the great work already¹ accomplished by the American Red Cross in the domain of social hygiene, and such are the truly masterly projects for the immediate future. We cannot be too grateful to our friends from America for all the help that they are affording us and for the spirit which informs it. May I close this analysis of the work of the American Red Cross with the words quoted by Mr. Chevrillon in his preface to a pamphlet by Mr. U. Kellogg:

"We now know that your cause is our cause—that of humanity, of right against might, of the spirit against matter, of civilization against barbarism, of good against evil. We have come to understand that this is the greatest of the wars of religion, and that it is as crusaders that we come, as it was as crusaders that your own Lafayette and Rochambeau came to fight for the liberty of a people. Now, as then, we feel that France is the rampart of civilization. She must not be shaken, she must emerge from this struggle to retake her historic role, and that thus, may be, we have come, while she is giving without counting the cost, to heal your wounds, to cheer you for the combat, in anticipation of the day when we shall be found fighting at your side."

¹At the end of the winter of 1917-18. Tr.

GENERAL RESUME OF THE MEDICAL SITUATION IN BELGIAN CONGO, CENTRAL AFRICA.

By F. C. CARR, M.D., Swarthmore, Pa.

The medical work in this section of the tropics is carried on by missionary societies, state of Belgian Congo, and private commercial companies. The greatest percentage of the medical work is done by the mission hospitals, of which the American Presbyterian Congo Mission's Hospital at Luebo is the foremost.

The American Presbyterian Congo Mission has a modern hospital and operative pavilion containing 100 beds. This medical center is in charge of Dr. L. J. Coppedge, of North Carolina, and is composed of medical, surgical, obstetrical, gynecological, and outpatient departments. The nursing staff is in charge of an excellent trained nurse, R. N., who has developed a corps of assistants from native material. One would be surprised to see how observing and sympathetic the native nurses are in the sickroom, how accurate in reading and recording temperatures and dispensing medications, and with what care and skill they observe the difficult technic of the operating room while assisting at a major operation. The statistics of the mission's hospital show the operative results compare very favorably with those of the large medical centers "back home." This speaks most highly of the native nurses' technic. They prepare the sterile goods prior to operation, act as nonsterile and at times sterile nurses at the operation, and after operation are the ward nurses.

The African native, like all aborigines, has the greatest respect for medicine, both good and evil; in fact, he believes all sickness and death are due to some one making bad medicine. One patient, after his operation, was asked why he went to sleep. He replied, "N'gangaboka kutuba kulala, me kulala." (Witch doctor ordered me to go to sleep, so I went to sleep.) The popular conception of a general anesthetic is that the patient is killed, the pain removed, after which the patient is brought back to life again.

The outpatient department consists of a daily clinic, where over 100 patients are treated by native nurses. The more common diseases and complaints, such as headaches, ulcers, etc., are treated by the native nurses without consulting the physician-in-charge. But the more difficult cases, such as filariasis, sleeping sickness, relapsing fever, leprosy, black water fever, etc., receive personal professional attention. The early cases of sleeping sickness receive weekly intramuscular injections of atoxyl, and relapsing fever patients receive intravenous injections of salvarsan.

Each dispensary patient must pay five ears of corn for his medi-

cine, and, if an operation is necessary, a goat must be paid. These food fees are utilized to feed the hospital patients.

His majesty, King Albert of Belgium, in recognition of the great work the medical department is doing in this section of the Congo, has graciously bestowed the "Order of the Royal Lion" on the physician-in-charge.

The most prevailing disease among the whites in this section of the tropics is malarial fever, but the prophylactic treatment of taking 5 grains of the bisulphate of quinine daily has been most efficacious.

It might be interesting to know that one large mining company lost only two-thirds of 1 percent man shift days on account of illness in 1916, and $1\frac{2}{3}$ percent man shift days in 1917; that is, only two days in 1916 and four days in 1917 were lost per man per year. This company's concession is in the torrid zone, 5 degrees south of the equator. The increase in the amount of time lost in 1917 was due to a patient being ill with tuberculosis throughout the whole year, his condition being such as to make it impossible to invalid him home at once.

Tuberculosis is becoming a serious disease among the natives. They are especially susceptible to Koch's bacilli. When once the disease is contracted, the course is very rapid, for their diet is almost exclusively carbohydrate, they sleep in small, stuffy, congested houses, and they are continuously exposed to rain and cold. To illustrate, there is a daily morning variation in temperature of 30 degrees. In the early morning hours, when one is quite chilly, the native does not put on many clothes, for his friends would not notice his clothes at such an early hour. The native's ignorance of and indifference to personal hygiene and sanitation are causing a rapid spread of the white plague.

The African is more susceptible and less resistant to all kinds of pulmonary conditions than his American brother. When an actual case of pneumonia develops, the mortality is 70 percent, death usually occurring on the second or third day. In case the patient lives three days after the onset of his illness, the prognosis is good. This form of pneumonia is almost as malignant as the pneumonic form of the plague in the Peking-Kalgan district of China last winter.

Filariasis is quite common, but rarely causes any subjective symptoms. The diagnosis is usually made accidentally while examining the patient's blood for malarial plasmodium. Repeated intravenous injections of both old and new salvarsan in these cases gave absolutely negative results.

There is a great future for tropical medicine. The research worker will find it a most interesting field, and America must develop specialists in tropical medicine, for tropical diseases will be much more prevalent in the United States after the present great war.

CURRENT NOTES

Ligation of Splenic Artery for Banti's Disease.

Blain reports a unique successful case of this operation, with a follow-up history of more than four years. He follows the case report with an account of experimental work on dogs.

The patient was a Greek, male, aged 38. The chief complaint was shortness of breath, weakness, and pain in the left upper abdominal quadrant; the chief physical sign was a swelling occupying the left side of the abdomen and extending 3 inches below the umbilicus, the splenic notch serving to fix the identity of the organ involved.

Blood Examination.—On admission, blood examination showed: erythrocytes, 3,840,000; leukocytes, 5,555; polymorphonuclears, 58; large lymphocytes, 5; small lymphocytes, 35.5; eosinophiles, 1.5; hemoglobin, 70; no plasmodia.

Stool and Urine.—Negative.

Diagnosis.—Banti's disease. Splenectomy decided on.

Operation.—The spleen was enormous, and firmly bound down on the posterior surface and to the diaphragm. The veins from the spleen were enormously dilated and very thin. Splenectomy being considered too hazardous, the splenic artery was ligatured, with chromic catgut, in two places about 3 centimeters from the spleen. There was an immediate shrinkage of one-fourth in the volume of the organ.

Subsequent History.—Patient walked out of hospital on the seventeenth day. A few days later a slight painful bulging having made its appearance in the center of the wound, it was opened and a large amount of broken-down splenic tissue exuded. The wound finally healed in six weeks, at which time the hemoglobin was at 90.

For over four and one-half years the patient has remained entirely well and he is doing heavy work.

Experimental Work.—This consisted of ligation of the artery or veins, or both, in dogs. The following are the conclusions: if strict asepsis or antisepsis is observed, the operation of ligation of the artery or veins of the normal spleen in dogs is unattended with mortality. While the immediate result differed according to the class of vessel tied, the final result was an *atrophied* organ.

Blain summarizes as follows: the operation of ligation of the splenic artery will not supplant splenectomy, but, in selected cases, it may present advantages.—Surgery, Gynecology and Obstetrics, June, 1918.

Therapeutic Influence of X-Rays on Female Pelvic Disease.

Sir John Phillips, Consulting Obstetric Physician to King's College Hospital, London, in an address before the North London Medical Society, discussed the results of his seven years' experience of the treatment of female pelvic disease with x-rays, and compared them with his thirty years' experience of operative treatment results.

In applying these rays, two important principles should be laid down: (1) an accurate diagnosis should be made of the condition present, and (2), owing to the complexity of the process, the treatment should be carried out by an expert under the supervision of a gynecologist.

CLASSES OF CASES—RESULTS OF TREATMENT.

The classes of cases in which Sir John has recommended the treatment are as follows:

1. Fibroids of the uterus, whether producing hemorrhage or pain, or the subject of rapid growth.
2. Myofibrosis or metritis.
3. Carcinoma of the cervix, and as routine treatment before, during, and after complete extirpation of the uterus.
4. Colitis.
5. For sterilization after Cesarean section in place of exsection of the tubes; also in severe dysmenorrhea and osteomalacia.
6. Constitutional hemorrhagic diseases (hemophilia, purpura hemorrhagica).
7. To promote absorption in old-standing chronic thickening.
8. Certain skin diseases of the vulva—namely, pruritus, leucoplakia, etc.

The immediate results may be: 1, cessation of menstruation without any return; 2, a profuse loss at the next menstruation and then entire cessation; 3, gradual diminution in the amount lost, with final cessation; 4, increase in the hemorrhage, temporarily; 5, no change.

The more remote effect of x-rays are not at present clearly defined. For instance, what is the effect on the action of the uterus, intestines, bladder, and other pelvic organs? There seems no doubt that, not only does atrophy of the ovaries take place, but that there is some far-reaching effect on the uterine muscle, that probably the blood composition is in some way affected, and, lastly, that the general health of the patient may be in some way modified, usually by a feeling of improvement in tone.

As an operator of more than thirty years' experience, Sir John had many opportunities of watching the remote results of his own cases and those of others, and he has been struck with the fact that many, although brilliant immediately, have later not fulfilled the expectations of the operator. For instance, a hemorrhagic fibroid may have been removed, yet, although the patient has lost the hemorrhages, she remains a mental and often physical wreck. Again, ovaries and tubes have been removed for various pelvic conditions, and, although the operation has been skillfully and completely done, the patient's condition is either unaltered or may be somewhat worse than before the operation. These facts have necessarily made one ponder as to whether some less drastic treatment might not have been successful in these cases, and there is no doubt that a certain percentage of all pelvic disease may have been better and more satisfactorily treated by the exhibition of x-rays.

ADVANTAGES AND DISADVANTAGES.

1. *Advantages.*—(a) The treatment is quite painless. (b) It occupies one to three months only, and, if it fails operation, can be carried out under the same conditions as before the sittings. (c) In a successful case the menopause which results is not usually attended by any of the nervous disturbances noticed in many cases of normal or postoperative menopause. (d) The cost is much less than that entailed by operation. (e) Sitzings may be given during menstruation without detriment, although some observers assert the contrary. (f) Bad after-effects are not so frequently noticed.

2. *Disadvantages.*—(a) The length of time which must necessarily elapse after the sittings have taken place before a permanent cure can be ascertained to have resulted. For instance, in some fibroids rapid shriveling, in addition to cessation of the hemorrhage, takes place; in others the cure is not so rapid, and may require a second series of sittings, and even then the fibroid only partially disappears. Moreover, we are not yet certain that at some more or

less remote period after the sittings there may not be a recurrence of the symptoms, although this is not common. (b) The danger of burning of the skin. This is practically a preventable accident, and Phillips has no doubt that, as improvements go on, this will never occur. (c) The possibility of some malignant change taking place in the atrophied uterus or fibroid tumor.

Sir John's own personal feeling is that in x-rays we have a very powerful remedy, which, with increasing accuracy of diagnosis and administration, promises to be of inestimable value in the pathological female economy.—*The Lancet*, March 23, 1918.

Radium in Uterine Hemorrhage.

Dr. C. Jeff Miller, of New Orleans, in a paper on this subject says:

"If conclusions may be drawn from a limited number of cases, it has been proved that radium possesses almost a specific effect in the control of certain types of persistent uterine hemorrhage. It possesses every advantage over x-ray treatment in that it acts promptly, is free from the risk of cutaneous burns, is easily applied, and acts by producing changes in the endometrium or uterus, rather than in the ovaries. It will reduce the size of probably 80 percent, cause the disappearance of many fibroid tumors, and, if carefully used, excessive menstruation may be reduced without causing amenorrhea.

"Those who have had experience with radium must agree with Kelly and Burnam, who state: 'In its brilliancy of curative results it is fully equal to radical surgical procedures, while offering the advantages of freedom of pain and the various postoperative complications and sequellæ. Furthermore, when radium fails, we still have the operation to fall back on and have lost nothing in the waiting.'

"Since such results may be obtained by a method of treatment that entails only one or two days' confinement to bed, and which causes only temporary discomfort amounting to little more than nausea or uterine colic, we must accept radium as a most valuable and necessary adjunct to gynecological surgery."—*Surgery, Gynecology and Obstetrics*, May, 1918.

Banti's Disease a Syphilitic Manifestation?

Norris, Symmers, and Shapiro, writing in the *American Journal of the Medical Sciences*, state that Banti's disease as an entity has no legitimate claim to recognition, and that the term long covered a conglomeration of conditions which are gradually being recognized. By an extensive study of abundant anatomical material the authors conclude that syphilis adequately fulfills all the requirements enumerated by Banti. Their conclusions follow:

1. The so-called Banti's disease is neither an independent clinical nor an anatomical entity, and the designation should be eliminated from the nomenclature of splenic pathology, since it not only carries with it the objections customarily urged against the surnamed diseases, but is in reality a manifestation of visceral syphilis. This conclusion is based on the following facts:

(a) The later stages of acquired syphilis are occasionally attended by enlargement of the spleen, arising absolutely independently of cirrhotic changes in the liver, and, when combined with the secondary anemia so constantly to be observed in the syphilitic, it fulfills the essential requirements of the first, or preascitic, stage of Banti's disease as originally postulated.

(b) In other cases of late acquired syphilis, splenomegaly and cirrhosis of the liver are combined, in which event jaundice, subcutaneous and submucous

varices, ascites, digestive disturbances dependent on chronic passive congestion of the gastrointestinal mucous membrane, hematemesis, and related changes constitute an exact clinical counterpart of the picture given by Banti for the intermediary and final stages of the disease described by him.

(c) The syphilitic cirrhosis of the liver just referred to is of two varieties, one corresponding to the atrophic or hob-nail liver of Laennec, in which syphilis is an etiological factor in at least one-third of all cases; the other, the coarsely lobulated liver in which syphilis is universally recognized as the specific cause.

(d) In 4,880 autopsies at Bellevue Hospital cirrhosis of the liver occurred 74 times in 314 luetic subjects, or in 23.4 percent, and of this number there was an associated splenomegaly of marked proportions in 48, or 64.8 percent. Of the 74 cases, 50 were of the coarsely lobulated type and 24 of the atrophic or hob-nail variety.

2. The histological changes in the spleen in the condition described by Banti are identical with those due to syphilis. The lesion is a chronic diffuse interstitial splenitis, attended, in certain instances, by sclerosis of the malpighian follicles. Banti and his followers attach great significance to the latter finding. As a matter of fact, sclerosis of the malpighian follicles is characteristic only of recessive status lymphaticus, in which it occurs with almost unfailing regularity, and in the spleen of the so-called Banti's disease it is but a coincident histological change.—Abstracted in *International Abstract of Surgery*, May, 1918.

BOOK REVIEWS.

DIAGNOSTIC SYMPTOMS IN NERVOUS DISEASES. By Edward Livingston Hunt, M.D., Assistant Professor of Clinical Neurology, College of Physicians and Surgeons, Medical Department of Columbia University, in the City of New York. Second edition, revised. Philadelphia and London: W. B. Saunders Company, 1917.

The second edition of "Diagnostic Symptoms in Nervous Diseases" has gained a great deal by the addition of a chapter on "Spinal Localisation." There are, besides, new chapters on "Cerebrospinal Fluid" and "Vertigo," but the addition of the chapter on "Spinal Localisation" is especially to be welcomed in view of the fact that a study of the reflexes and the changes in the reflexes becomes mere memory work unless there is at the same time a comprehension of the nature and localisation of the organic change. It would, therefore, perhaps even be an added advantage to have with the discussion of each reflex the anatomical and physiological explanation more in detail; the introduction of one or more charts showing the main nuclei and tracts would no doubt aid a great deal in this without making any essential change in the bulk or scope of the book.

Another suggestion would be the addition of the usual diagram showing the distribution of sensory areas and spinal localisation. The lack of this diagram will oblige the student or practitioner seeking the interpretation of a symptom complex to consult some other neurological or physiological text book, as it is next to impossible, especially for those not continually engaged in neurological examinations to remember the sensory root zones. It is true that these zones are not sharply defined and subject to many variations, as the study of the numerous isolated nerve lesions during the European war has shown; but still a chart of this sort inaccurate though it may be, is more or less a necessity, and its omission is to be regretted, especially as full directions are given for the localisation of motor nerve lesions.

In the chapter on "Cerebro-spinal Fluid" the number of cells to be regarded as pathological is given as "above ten." That would seem rather high in view of the fact that cases of undoubted cerebrospinal lues with between 7 and 10 cells are not rare.

The illustrations are well chosen and distinct, the text is limited to considerations within the prescribed scope of the book. To the student studying neurology, to the practitioner not wishing to forget, the book should prove a handy and desirable aid.

OBSTETRICS NORMAL AND OPERATIVE. By George Peaslee Shears, B.S., M.D., Professor of Obstetrics and Attending Obstetrician at the New York Polyclinic Medical School and Hospital; Formerly Instructor in Obstetrics Cornell University Medical College; Attending Obstetrician at the New York City Hospital; Senior Attending Obstetrician at the Misericordia Hospital. Philadelphia and London: J. P. Lippincott Company, \$6.

This is a text book of obstetrics based upon a new plan, that of making the practical side of obstetrics the more prominent, and devoting less space to the more theoretical subjects such as developmental anomalies, and the physiology of menstruation. The traditional section on the development of the ovum, as a subject in itself distinct from obstetrics, has been omitted altogether.

Dr. Shears has succeeded in writing an intensely practical work, one which reflects his own large experience in hospital and private practice. So accurately

has he accomplished this that the reviewer has been struck again and again with the impression that he himself might have written the page under his eye. This book should be of the greatest value to students, house officers, and practitioners of obstetrics.

The illustrations have been well selected with a view to showing at a glance the points they are intended to bring out. Dr. Shears has borrowed illustrations of unusual value from standard works, as well as using numerous original photographs taken at the New York City Hospital and elsewhere.

The chapters on operative obstetrics are particularly good. It is to be regretted that he gives the student the impression that it is an easy thing to make an early diagnosis of pregnancy, which is likely to lead the young practitioner into many pitfalls. He considers shaving the vulva unnecessary. This is also regrettable as the vagina of the parturient woman must be considered as a surgical wound, and the retention of hair, even closely clipped, favors the lodgement of infectious material.

One thing to be especially commended is his advice never to do operative obstetrics except on a table, and always to be prepared for any major operation even in the most apparently simple case. This advice, if followed, would save many a disaster. This book is worthy of a place on the desk of any student or practitioner of obstetrics.

DISEASES OF THE DIGESTIVE ORGANS. With special references to their diagnosis and treatment. By Charles D. Aaron, Sc.D., M.D., Professor of Gastroenterology in the Detroit College of Medicine and Surgery; Consulting Gastroenterologist to Harper Hospital. Second edition, thoroughly revised. Illustrated with 156 engravings, 48 roentgenograms, and 9 colored plates. Philadelphia: Lea & Febiger, 1918, \$7.

A book on the diseases of the digestive organs which strives to keep abreast of the times is today subject to many revisions. It is hard to draw the line when deciding what methods of classification, diagnosis and treatment are still in the stages of pure theory or experimentation, and what may be accepted as sufficiently well founded to be included in a thoroughly modern and still conservative work. In the second edition of Aaron's book this decision has in every respect been eminently well made. Further investigations in Roentgenology, an increasing knowledge of the autonomic nervous system and its importance, the study of the focal infections, have thrown much light on conditions hitherto only suspected or deduced, and have inaugurated new lines of diagnosis and treatment. These things have been fully taken into consideration in the present edition, and with the changes, additions, and the matter already contained in the first edition, form a very valuable treatise on gastroenterology and one that is worthy of the closest study. Especially the chapters on neuroses of the gastrointestinal tract, probably the most wide spread derangement encountered today, offer a comprehensive survey of the present status of this branch of gastroenterology.

The practitioner who is most interested in the therapeutical aspect of the diseases discussed, will find clear directions logically worked out and a great number of excellent prescriptions, he will find also the simple methods of examination, without which he cannot hope to make a diagnosis. Those who have the opportunity to subject their patients to the more elaborate functional tests and examinations, will find in the chapters devoted to these methods much valuable aid.

A detailed table of contents allows one immediately to find the topic that interests him for the moment. The text is fluently written and easily readable. Paper, print and illustrations are of first class workmanship. The book is, in fact, one that it is a pleasure to possess and a still greater pleasure to study.

ELECTROTHERAPY IN GYNECOLOGY. By Samuel Sloan, M.D., Consulting Physician to the Glasgow Royal Maternity and Women's Hospital, and to the Glasgow Hospital for Diseases of Women, etc. New York: Paul B. Hoeber, 1918, \$4.

Electrotherapy, as first introduced into the practice of gynecology chiefly by the efforts of Apostoli, has practically disappeared, after having been tested thoroughly and found wanting. An effort to reawaken interest in this form of therapy, therefore, seems rather hopeless. The author very clearly presents the principles of electrophysics. The chapters dealing with the physical and chemical characteristics of the various types of currents will prove of incalculable value to anyone desirous of acquiring accurate information concerning these facts. The writer, however, fails completely in proving any beneficial therapeutic effects of these currents in gynecology. From the standpoint of the modern gynecologist the overwhelming majority of the cases cited by the author are too vaguely described and too inaccurately diagnosed to permit any definite conclusions as to the efficacy of the electric treatment in the individual case. Unfortunately this volume fails entirely to consider the one more promising phase of electrotherapy—viz., the applications of x-rays. We, therefore, cannot prognosticate great popularity to this latest publication, particularly not at the price of \$4.

STATE BOARD EXAMINATION QUESTIONS AND ANSWERS OF THE UNITED STATES AND CANADA. A practical work, giving authentic questions and authoritative answers in full that will prove helpful in passing state board examinations. Reprinted from the Medical Record. Fifth edition. Altogether new matter. Every question answered in full. New York: William Wood & Co., 1918, \$2.50.

The purpose of a book of this sort can necessarily only be to give the candidate for examination an idea of the nature of the questions asked and the answers expected. It is by no means intended that a study of the answers be equivalent to a preparation for the examination and still less for practice, as the questions given cover but a small part of the knowledge that must be presupposed in each branch of medicine. However, as long as aids of this sort are desirable and in demand, every attempt at modernization of the contents must be welcomed. In this respect the present volume shows a decided advance so that the candidate is relieved of the confusion caused by finding answers more or less contradictory to what he has lately learned in a modern school of medicine.

BURNS AND THEIR TREATMENT, including Dermatitis from High Explosives. By J. M. H. MacLeod, M.A., M.D., F.R.C.P., Physician for Diseases of the Skin, Charing Cross Hospital, Royal Flying Corps Hospital, etc. New York: Oxford University Press, 1918, \$2.

This modest little book contains an excellent discussion of burns and their treatment. It takes up, in succession, burns due to heat, electricity, lightning, the x-ray, radium, the sun, corrosive, and the dermatitis from high explosives. Being one of the "Oxford War Primers" series, it makes no pretense at exhaustive treatment of the subjects under consideration, yet by means of clear, concise text covers the ground admirably. References are given at the end of each chapter, where fuller discussions may be found. The book may be read in an hour or so, and will prove time well spent for anyone whose practice deals either casually or intimately with cases of this nature.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

AUGUST, 1918.

No. 8

EDITORIAL.

THE SURGEON'S RESPONSIBILITY FOR ASEPSIS.

A surgeon in a modern hospital may well be compared with a general who has under his control all the activities that make up a modern army. He must have many responsible individuals under him, to whom he can delegate many of his duties, but at all times the final responsibility rests solely with him.

Of the many duties that fall to the lot of a surgeon in charge of a large hospital service, one of the biggest problems is the control of the surgical technic of his department. No matter how many men he has under him, no matter how many other men operate besides himself, he should always assume the responsibility of the successful carrying out of the surgical technic. In order to do this effectively, he must build up an organization which has three characteristics—first, a deep sense of responsibility; second, veneration for the profession of surgery and loyalty to their chief; third, competency.

In order to instil into his staff—which of course includes not only physicians, but also the nurses—this deep sense of responsibility, he should himself, or through a competent assistant, present from time to time to the entire staff his conception of what constitutes a "surgical conscience." The term "surgical conscience" as used here means ability of an individual to criticise his own surgical technic most severely. It represents the quintessence of conscientiousness. In order to develop a proper surgical conscience in the medical and nursing staff, force of example plays a great role, and the surgeon should always be ready to recognize, acknowledge, and correct in the presence of his staff any slip in technic he may make. A single neglect on his part may undermine the morale of the entire surgical team.

To develop the proper esprit de corps, the assistants and head nurse of the operating room have to be selected with the greatest

care, and only such individuals should be put in charge of the service who, after a long trial, have proved themselves genuinely interested in surgery and its progress. Halfhearted cooperation should never be tolerated. The type of staff here referred to can best be obtained where the system of permanent residents exists. These young men are selected from a considerable body of interns, and are always men who have decided that they wish to become surgeons and are willing and anxious to put in quite a number of years to prepare themselves properly. Some men may hold the position of assistant resident for several years and then be found wanting in some essential quality deemed necessary for a resident. The man who is ultimately selected for the residentship is a tried man and one well able to represent his chief's ideas properly. He has had ample experience to carry on all the routine work of the department. The probable change in many hospital services due to the drafting of young medical men may seriously impair the efficiency of the service, and surgeons will have to watch particularly for its effect on the surgical technic.

A resident surgeon who has worked with his chief for a number of years soon acquires his point of view and imparts to the men under him the spirit and ideals of his chief. To further bring about this cooperation, the greatest intimacy and frankness should exist between the surgeon and his resident. The surgeon should not hesitate to discuss freely with his resident mistakes or any defects that he has observed in his own operative procedure. He should be introspective, and permit his resident to share any misgivings he may have at any time. It is, of course, desirable that the resident as well as the rest of the staff should be devoted to and respect their chief. It has always seemed to me that nothing adds more to the smoothness with which a surgical service runs than a wholehearted support of the chief by his staff. In spite of all kindness, he should be the chief, and never permit his intimacy with the staff to become so great that they ever lose sight of the fact that he is the commanding officer.

It should be the duty of the chief to outline in detail the surgical technic that is to be in force in the department. He should know down to the minutest detail how all sterilization is carried on. He should inform himself from time to time whether the methods that he has outlined are being carried out, and no change should ever be permitted without first consulting him. All men who work in the department should employ the same methods of preparing themselves and their patients for operation. Whenever variations are permitted, errors are likely to creep in. A technic should be devised by him which is as simple as is compatible with efficiency. He should always prepare himself for an operation in the presence of his assistants, so that they may always realize that he exercises

the same care that he requires of them. If an infection occurs, he should not rest until the source of the infection has been ferreted out. Under no circumstances should he ever hide behind the statement that "in a large service accidents are bound to happen occasionally." He should make free use of laboratory controls, and, if an error in asepsis occurs, should discuss it with his staff, and, if he is fortunate to be connected with a teaching hospital, should not hesitate to bring before his students any surgical calamity. Even if he finds that an assistant or a nurse has made a mistake in technic, the responsibility for this error always should be assumed by the surgeon, and, unless he is willing to assume this responsibility, he cannot be considered as suitable to head a surgical department.

ERNEST SACHS, M. D.

MEMORY.

Courses in memory training are taking a boom, and advertisements of them meet one's eye at every turn. It is probable that the majority of those who read these advertisements and do not take the courses preserve an impression of quackery, and it is certain that most of those who take lessons or who commence to do so are dissatisfied with the result.

Yet the fault is not, as a rule, entirely or even largely with the systems advertised. So far as one has been able to ascertain, they all bear a strong family likeness to the remarkable system exploited by Loisetie thirty or more years ago. Such modifications as have been introduced have not always been happy.

There are three points at which the memory process may require reinforcement: in the formation of the first impression, in the association of the new idea with those preexisting in the mind, and in the conductivity of the chain of associations.

The rapidity and the precision with which we can "recall" or "recollect" an idea depend, *cæteris paribus*, on the distinctness of the original impression, and on the conductivity of the chain of associations between the recollected idea and that idea in the mind which should call up the representation of the former.

These two factors—the distinctness of the original impression and the proper working of the associative processes—*both* depend on the mind content and habit of the subject and on the inherent nature of the original idea.

1. An uninteresting idea, presented to the ill concentrated attention of a mind poorly stocked with ideas capable of associating themselves with the idea presented, as well as with ideas in general (unaccustomed to search for or make up for the gaps in association), stands the minimum chance of rapid and precise recollection.

2. An interesting (1) idea presented to the closely (2) concentrated attention of a mind richly (3) stocked with ideas capable of associating strongly with the presented idea (or accustomed (4) to fill up gaps in such associated links) stands the best chance of a rapid and precise recollection.

If in (2) above we substitute the word "uninteresting" for "interesting" at 1, two results happen:

1. The number and individual distinctness of associable ideas called up is diminished.

2. The strength of their association is less—i. e., the conductivity of the chain is reduced.

The idea, therefore, risks being less forcibly and less accurately impressed, and will be less rapidly and less surely recalled.

If this is true, then what we have stated above is partly proved—viz., that the nature of the idea affects both the forward and backward processes, involved respectively in memorizing and in recollecting.

Similarly, if at 2 we read "ill" for "closely," or at 3 "poorly" for "richly," or at 4 "unaccustomed" for "accustomed"—in other words, if we change the habit and content of the "mind" in the directions indicated—both the force of the original impression and the conductivity of the chain of associations is diminished, with the result to be foreseen.

The above is not by any means an exhaustive analysis of the factors involved in the memorizing and recollection of an idea. It is meant to bring into relief those factors on the development of which it is not too difficult to exercise a favorable influence.

Let us, first of all, speak of the mind content or habit. It is notorious that, whereas some folk have a predominantly visual memory, others have such a memory habit that auditory impressions (or the like) are more easily received, and the ideas they represent more easily recollected.

Then, again, there is the index or concept memory. This is said to be the characteristic adult memory—at any rate, of learned men.

The combination of these last two classes in one gives us the typical oriental or bookish memory. It is also the "donnish" memory. It is in practical life the most disastrous form of memory it is possible to possess.

I have been obliged to make a very close study of its peculiarities, chiefly because, had I not done so, I should, in my work as medico-legal expert to the Egyptian Government, and especially in my referee work, have floundered in a morass of uncertainty and suspicion.

Now, exceptions excepted, this is how a typical Egyptian medical man acting in perfect good faith will deal with, say, the medico-legal aspects of a wound in a criminal case. He makes his examina-

tion and draws his conclusions, partly from what he believes he has observed, and, in nine cases out of ten, not uninfluenced by what has been suggested to him by the circumstances of the case or by the persons interested. Having drawn his conclusions as to the nature of the wound and its mode of causation, he writes a report, embodying his constataions and opinions.

An experience of thousands of cases has convinced me that, from this point on, our typical Egyptian doctor dismisses from his mind the whole objective side of the case. Having classified the wound as being of such and such a nature and origin, it no longer has an objective existence for him—the idea of it has become a concept, indistinguishable from the general concept of all other wounds of the same nature caused in the said manner. If you question him about it, his answer is not based on a reference to a mental image of the wound as it presented itself to him at the time of examination. His answer refers to his general concept of such a wound as he has concluded this particular wound to be.

Until I grasped this essential peculiarity of the oriental mind, evidence given in such cases in cross-examination having frequently been provably erroneous on matters of fact, I was tempted to believe, as most of the magistrates did and do believe, that there was bad faith on the part of the witness—bad faith either in drawing up the original report, or in bolstering up an originally honest but erroneous opinion by false statements of fact.

This habit of mind having great influence on the sharpness and accuracy of the original impression, it should logically be our first point of attack in an attempt to improve the memory, the more so that its education or reeducation is the slowest of all the processes involved. This is impracticable with large classes and ready-to-wear courses. It is, in practice, a matter for early education. Still, something can be done along the lines of Kim's education in visual memory.

Loisette used to say that his most brilliant pupils and his most wretched failures were the same—those to whom the fundamental work was no "grind." They could pass from lesson to lesson with ease, and would finish the whole course before the training effect had had time to act. We have here a fundamental quality of every good memory training system. Three things must be provided: a method of memorizing which builds up the natural memory, an artificial memory for such abstractions as figures, and exercises available at any moment in life for improving the concentration of the attention at the moment in question.

The conscientious working through such a course is a task that few have the courage and application to complete, but to those who do stay with it to the end the reward is great. At an early date I will return to this subject, and hope to lay before the readers of

the INTERSTATE an outline of a method that has the three fundamental requisites predicated above.

BLOOD CULTURE AND THE WIDAL REACTION IN TYPHOID FEVER.

There seems to be a disposition on the part of some workers in clinical medicine to adhere to the idea that the diagnosis of typhoid fever can easily be made by direct examination of the patient, and that the laboratory is useful only in a confirmatory sense. They also believe, owing to the variable time of appearance and difference in respect to quantitative agglutination, that the Widal is the only laboratory test available for proving the specific character of enteric fever.

In order to set these matters before the profession in their right light, it may be well to quote, somewhat freely, from the recent classic on typhoid fever written by Frederick P. Gay, than whom there is no one more competent on this subject. Referring to the question of diagnosis in typhoid fever, Gay very properly states that, while the accuracy of purely bedside diagnosis in typhoid is, in the hands of the experienced, considerable, still such accuracy is more particularly true in retrospect; an early clinical diagnosis can never be made with certainty. He says, further, that no modern physician should wish, or be obliged, to make a diagnosis of typhoid fever without laboratory aid, and it is doubtful if he would ever be justified in arriving at a positive diagnosis when a complete series of laboratory examinations fail to confirm his clinical opinion. Clinical suspicion of typhoid is, however, the necessary incentive to laboratory diagnosis in tests, and the suggestive symptoms which lead to such suspicion are well known—namely, fever, malaise, headache, insomnia, diarrhea, with chill or nosebleed, pain in epigastric regions, etc.

Regarding the laboratory diagnosis, the blood culture in typhoid fever is positive in 75 percent of all typhoid fever cases, success depending on the stage in the disease in which the culture is taken. So far as the time when the culture method to be successful is concerned, the greatest number of positives occurs in the first week of infection, the number diminishing from the first week or the early part of the second week. Blood cultures are also positive frequently in the relapses of typhoid. Coleman and Buxton list cultures from relapses in 33 cases, of which 90 percent were positive. Clarke obtained 37 positive cultures out of 46 cases (80 percent).

The best method to make the culture is as follows: Choose one of the superficial arm veins, and place a tourniquet above. Sterilize the area with soap and water, followed by bichloride and alcohol,

or by the use of iodine followed by alcohol. Remove the blood by means of a sterilized glass syringe and needle, using a syringe of 20 cubic centimeters capacity. Use a needle of 18 gauge. Eject 10 cubic centimeters of the blood thus obtained into 200 cubic centimeters of 10 percent bile bouillon. The presence of gram negative, actively motile bacilli in the culture from a suspected case is presumptive evidence of typhoid or paratyphoid fever. In order to complete the proof that the given organism is the typhoid bacillus, we have to show that it is a gram negative, motile bacillus, which produces very slight acidity in and never coagulates milk, produces acid in glucose media without gas, and no change in lactose or saccharose. It produces no indol in peptone water or in bouillon, and no change in neutral-red agar. In addition to this, it is necessary to prove its specific response to antityphoid serum. This kind of diagnostic serum is made by immunizing rabbits, horses, or goats by repeated injections of one or several authenticated typhoid strains. An artificial immune serum for diagnostic purposes should be able to clump laboratory strains of typhoid in dilutions of 1 to 5,000 or more.

Now as to the usefulness of the Widal reaction in the diagnosis of typhoid. The technic of this test is too well known to merit further description. There are two methods—the microscopic and the macroscopic. The latter method is a little more accurate, inasmuch as it measures the actual potency in agglutins of any given serum. It should be remembered that a standard culture of the typhoid bacillus is always to be used in making these agglutination tests. No dilutions under 1 to 40 should be used for diagnostic purposes. The value of the test depends on a number of factors. A negative result does not rule out typhoid, owing to the fact that the agglutins are sometimes late in appearing in the blood, and often, too, are small in amount. A positive result is indicative of typhoid, with certain exceptions. The most important of these exceptions lies in the case of suspected typhoid fever in an individual who had been vaccinated against the disease, such individual showing agglutins in the blood for at least several months. Another exception is that this test does not differentiate between typhoid and paratyphoid infections. In general, it can be stated that a positive Widal ought to occur in at least 90 percent of all cases, increasing after the second week until it is positive in nearly all cases in the fourth week.

Summary: We have in the blood culture method a very exact method of laboratory diagnosis in the first week, and in the Widal a very good method after that. The two methods furnish very accurate means of diagnosis. Without belittling the results of clinical observation, it should be borne in mind that the laboratory measures of diagnosis are the only absolute means of diagnosis. This is

extremely important not so much from the standpoint of treatment as it is from that of prevention. The individual sick person, of course, needs an accurate diagnosis, but, in the case of an infection of this type, surely the needs of the well people in contact with the sick man are equally to be served. This is true in times of peace, but how much more so is it in time of war, when the community and national health is paramount! It is for this reason that the observations of Gay which we have cited should be noted by every physician in private as well as in public service.

R. B. H. G.

COLLECTIVE ABSTRACTS

VIEWS FROM THE LITERATURE ON THE TWO CHIEF POINTS OF CONTROVERSY IN MAGNET EXTRACTION OF FOREIGN BODIES FROM THE VITREOUS CHAMBER.

BY HARVEY D. LAMB, M.D., St. Louis.

The magnet extraction of foreign bodies from the vitreous chamber has always been a subject of much practical interest and importance in industrial eye work. Now in these war times the very frequent occurrence of vitreous foreign bodies has made this branch of work second to none in importance in eye surgery at the front. Whiting and Goulden state that in the hospital where they have been at work in France, in July, 1916, alone, there were 30 cases in which magnetic foreign bodies were removed from within the globe; in one day 5 such cases were operated on, and more recently 13 in one week.

The first question in this line of work which comes up for discussion is whether in an individual case a small or hand magnet as that of Hirschberg, Sweet, or Johnson, or a large one as that of Haab, Volkmann, or Mellinger, is the best one to employ.

Türk, for comparing the relative strength of large and small magnets, made very careful and exhaustive tests with the Haab and Hirschberg models. He found that, in general, for splinters from 1 to 250 mg. in weight, when the splinter is in direct contact, the power of the Hirschberg is but little less than that of the Haab magnet. At 2 mm. distance from the splinter, however, the Haab magnet is from 7 to 21 times as attractive for splinters weighing 1 to 250 mg. as the Hirschberg, and the more the distance is increased the more favorable become the readings for the Haab magnet.

Barkan, Sweet, and the Meyrowitz Company have also made tests with the Hirschberg and Haab magnets to compare their relative strengths. The result of all these experiments seems to definitely establish the great superiority of the Haab magnet in attracting small foreign bodies at a distance of 5 mm. or more from its tip. Where the magnet tip can be brought within 5 mm. of the foreign body, it is only necessary to use a large magnet if the particle is very small—1 mg. or less. For larger particles within 5 mm. the advantages of a hand magnet are very great in that it is more easy to handle, and the foreign body can be more gently detached and drawn through the tissues with less disturbance.

Of course, in some cases, where the foreign body has been for some time in the vitreous and has become encapsulated by fibrous tissue, the small magnet, though applied within 5 mm. of the particle, may fail to extract it, and recourse must then be had to the giant magnet, similarly applied. If the giant magnet fails likewise, Jackson recommends the use of scissors with the large magnet, the former to cut through the surrounding fibrous envelope.

The second well-known point of controversy in magnet work on foreign bodies in the vitreous is in regard to which route for extraction is preferable—the posterior, scleral, or the anterior, corneal one. Where a large unhealed wound

in the cornea or sclera is present, all agree that it would be hazardous to remove the foreign body through any other than the original wound. Those favoring the posterior or scleral route state its advantages are mainly in the ease with which the foreign body is removed and the consequent lack of traumatism to the eye. Its disadvantages, as set forth by its disclaimers, are the danger of infection by exposure of the vitreous, the greater probability of choroidal hemorrhage, the liability of subsequent retinal detachment, the degeneration of the globe through interference with the vitreous and the formation of a retinal cicatrix.

Advantages of the anterior chamber route, claimed by its advocates, are its safety, the wound in the limbus heals with less disturbance than that of the sclera and with no subsequent dangers, the possibility of infection is less, the probability of retinal detachment and choroidal hemorrhage is avoided in greater measure, and the nutrition of the vitreous is less interfered with.

Opponents of the anterior route state its disadvantages as being the danger of entangling the foreign body in the ciliary body or the iris, the undesirability of a second excursion of the particle through the vitreous, the danger of further wounding the lens, and, finally, the violence apt to be done the eye by the use of the giant magnet. The defenders of the anterior route claim its disadvantages are almost always the result of improper technic.

Sweet has repeatedly emphasized that it is difficult to make a satisfactory comparison of the value of operation by the two methods, since in each individual case the ultimate result depends on a number of factors, which are of as great, if not greater, importance than the method of extraction. Nevertheless, in spite of this rather obvious state of affairs, the writer will attempt to give some idea of the opinions of the authorities on the two methods.

It will at once be seen in these statistics of different surgeons that they are not directly comparable by any means. But since about 75 percent of the foreign bodies that get into the eye lodge in the vitreous chamber, and that about 75 percent of these in civil life are magnetic, we will give at least some kind of approximate estimate in our comparative figures where all foreign bodies in all parts of the eye are given.

ADVOCATES OF THE ANTERIOR CHAMBER ROUTE, LARGE MAGNET OPERATION, OR HAAB'S METHOD.

Haab, in 1902, gave the results of his first ten years' experience with his magnet. Of 134 cases of foreign bodies in the vitreous, 83 percent were extracted; 165 cases in all were tabulated, of which 33 percent had vision of $\frac{1}{4}$ or better.

Schmidt-Rimpler, in 1904, reported 38 cases, 28 of which were vitreous ones, and of all the 38, 92 percent of the foreign bodies were removed and 37 percent had final vision better than $\frac{1}{8}$.

Fisher, in 1903, 150 cases, of which 65 percent were extracted and 65 percent resulted in "good" vision.

H. Knapp and Stoll, in 1908, 66 cases, of which 77 percent were removed and 17 percent had final vision better than 6/15.

Knapp thinks a scleral incision should be avoided.

Thomson says enough cases have been observed by competent authorities to make it obvious that retinal detachment occurs more frequently than is generally supposed by the scleral operation, and he thinks that when the foreign body enters through the cornea there seems no longer any question that its removal through the anterior chamber is the most desirable.

Marple extracts through the anterior chamber when the foreign body has entered that way, and he is certain he extracts more foreign bodies via the anterior chamber than through the sclera.

Weeks thinks in many cases he will do less injury by removing the foreign

body through the anterior chamber, and he says that in not a few cases the removal of a foreign body by this method is attended by almost no traumatism.

Callan had several retinal detachments by the scleral method, but since Haab has brought out his method he has followed that procedure, and, except in a very few instances, has been successful. He says: "By long odds in my estimation Haab's method is the best."

Morax prefers this method, believing that it conserves best the delicate ocular tissues, and gives the best chance of avoiding the risks of infection.

Whiting and Goulden, at the front in France, have adopted the operation via the anterior chamber because they think the after-results are better by this method, and, in their service a considerable number of the foreign bodies being nonmagnetic, the scleral operation would, therefore, entail in many cases an unnecessary incision in the eyeball.

Hall Griffith states that since using a giant magnet he has never made a scleral incision if he could avoid doing so, as there was danger of detachment of the retina.

Clegg says this method is too drastic to take, for in most cases complications arise, such as loss of vitreous, later separation of the retina from shrinkage of the scar tissue, or chronic or acute uveitis, and the eye is lost not so much from the accident as from the operative treatment.

Other supporters are Mackay, von Schlösser, Deutschmann, Wagenmann, Schreiber, Sachs, Weil, and Barkan.

ADVOCATES OF THE SCLERAL ROUTE, SMALL OR HAND MAGNET OPERATION, OR HIRSCHBERG'S METHOD.

Hürzeler, in 1894, published a report on 313 cases collected from the literature of foreign bodies in the vitreous, of which 65 percent were removed through the sclera and 22 percent had preservation of good vision.

Hirschberg, in 1900, presented 100 cases, of which 65 had foreign bodies in the vitreous; 45 percent of the vitreous cases were operated by the hand magnet with success.

Andresen, in 1903, collected 346 cases from the literature, in 65 percent of which the foreign body was extracted and 20 percent had final vision 1/10 to 1.

Hellgreen, in 1901, described 60 cases treated in the clinic at Stockholm, where the foreign body was in the vitreous; 72 percent were removed, and 20 percent resulted finally in useful vision.

Sweet, in 1913, published a summary of all his foreign body cases, 982 in all, but 402 of these showed no foreign body by the x-ray, leaving 580 definite foreign body cases. Of these 580, 83 percent contained iron or steel particles, and 78 percent of the 580 cases were vitreous ones; in 65 percent of the 580 the particle was removed, in all the vitreous cases, by the scleral method, except in a few isolated instances; 11 percent of the 580 foreign body cases had vision 6/12 or better, and 19 percent at least 6/60. In this article Dr. Sweet includes a list of 60 foreign-body-in-the-vitreous cases, all of which had been observed for at least two years after the magnet operation; 75 percent of these had vision worse than 5/200, and 20 percent had vision 6/30 or better; 10 percent showed retinal detachment.

Sweet believes this method produces less traumatism to the structures of the eyeball. He thinks detachment of the retina occurs at the point of lodgment of the foreign body in the choroid or retina by the inflammation and subsequent contraction of new-formed tissue, where the parts have been injured by a fairly large-sized body. Or detachment results if a smaller body has remained for some days or weeks, and considerable traumatism has followed the drag of the magnet in disengaging the body from the exudate in which it is embedded. In the cases in which clear media permit an examination of the

retina, detachment of the retina at the site of the incision in the sclera has not been found by Sweet.

DeSchweinitz states that his experience with the operation has been most favorable.

Risley thinks this procedure the safer for the reason that a shorter canal in the vitreous is thus traversed and, if the body is impure, the extent of infected area is less.

Holt is inclined to think there are but few Americans using the large magnet and that the number will steadily diminish.

Ziegler thinks the scleral route is the best in the majority of cases, and he almost invariably resorts to it.

Jackson thinks there is much routine use of the large magnet without any previous attempt at localization or determination of the size of the body, which proceeding he strongly condemns.

Ohly, in 1916, presented 10 foreign body cases of his own in which he says he had the best results with the posterior method. He appends a fairly complete bibliography of the subject.

Collins favors this method whenever he can obtain exact localization by the Mackenzie-Davidson method, under which circumstances his results are excellent, he states.

Allport thinks it a great mistake to insist on drawing a foreign body from the vitreous chamber to the cornea when it can be much more easily, and he believes more safely, removed by an opening in the sclera.

Other supporters are Cridland and Rowan.

MODIFIED SCLERAL ROUTE OPERATION.

Some few eye surgeons favoring the posterior or scleral route use a large magnet applied to the incision in the sclera. Of these, Pooley and Whitehead have in the recent literature expressed such preference. Whitehead considers that, with a very powerful magnet, withdrawal by a posterior incision disturbed the vitreous least. His magnet is 50 percent stronger than any Haab magnet which had been made before.

NEUTRAL OBSERVATIONS.

Mayweg, in 1902, reported 92 cases operated by himself, of which 72 had foreign bodies in the vitreous. Of these 72, 47 were extracted by the scleral route, of which 19 percent resulted in vision 1 to $\frac{3}{4}$; 26 percent in vision $\frac{3}{4}$ to $\frac{5}{70}$; 25 of the 72 were removed by the anterior method, of which 8 percent had vision $\frac{1}{2}$, and 24 percent vision $\frac{3}{4}$ to $\frac{5}{70}$ —much in favor of the scleral incision.

Goulden, in 1908, published a list of 118 magnet cases treated at Moorfields. Twenty-six submitted to operation by the small magnet—all successes, with vision $\frac{6}{24}$ or better in 46 percent of the 26. Ninety-two operated by the large magnet, with 87 percent of foreign bodies removed, and of the 92, 45 percent had vision at least $\frac{6}{24}$; results here better for the large magnet because much the greater number were operated with it.

MacCallan, in 1902, compared 39 cases operated by Haab's method with 18 cases operated according to Hirschberg. Of the 39 strong magnet cases, in 90 percent the body was removed and 31 percent resulted in "good" vision. The 18 cases with the small magnet were all successful, with 16 percent good vision, thus favoring the large magnet operation.

CONCLUSION.

Apparently there is as much authority for one method of extraction as for the other. It must, however, be conceded by each side that both the large and

small magnets are necessary to an oculist's outfit, for, whatever method is favored, each magnet will at times be found of most value. The latter statement both Hirschberg and Haab concede to be true.

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RECENT ADVANCES IN THE ETIOLOGY AND TREATMENT OF LOBAR PNEUMONIA.*

By WALTER BAUMGARTEN, M.D., St. Louis.

The disease known as lobar pneumonia may be studied from a number of standpoints, especially from the clinical, pathological, and bacteriological sides. The most recent source of additions to our knowledge of this disease comes from the bacteriological studies and studies in immunity of the etiological agent. These studies have, in large part, been conducted at the hospital of the Rockefeller Institute, New York.

In order to determine the percentage of cases of lobar pneumonia which arise from the various organisms which are known to be causative agents of the disease, the organisms present in 480 cases were studied. Of these the overwhelming majority were caused by the *diplococcus pneumoniae*, as the following table shows:

<i>Diplococcus pneumoniae</i>	454
Friedländer's bacillus	3
<i>Bacillus influenzae</i>	6
<i>Streptococcus pyogenes</i>	7
<i>Streptococcus mucosæ</i>	1
<i>Staphylococcus aureus</i>	3
Cases of mixed infection with combinations of staphylococcus aureus, Friedländer's bacillus, bacillus influenza, streptococcus pyogenes, and streptococcus viridans	6
	<hr/> 480

In other words, in 94½ percent of the cases of lobar pneumonia the *diplococcus pneumoniae* is the etiologic agent.

It has been known for many years that the pneumococci are present in the mouth and nose secretions of a certain large proportion of healthy individuals. Morphologically and culturally these appear to be identical with the pneumococcus found in the sputum of patients sick with lobar pneumonia. It was not until the organisms in a large number of individual instances were studied biologically that it was found that not all pneumococci are alike. An immune serum was produced for each individual organism isolated from patients and others, and all organisms tested against each serum by agglutination methods and by the power of the serum to protect white mice against inoculation with each organism. It at once became evident that all pneumococci fall into two groups. The first of these groups embraces three distinct fixed types, which are absolutely independent and specific in their immunological reactions and in the power of their immune sera to protect against the individual types. The second group is represented by only one type, the individual strains of which are more divergent and exhibit no immunological reactions common to types of the first group or to strains of their own group. This group has been designated as type IV, and includes most of the pneumococci which occur in healthy individuals. The relative frequency of the occurrence of these types,

*An Abstract of Studies at the Hospital of the Rockefeller Institute and elsewhere.

as determined in the study of the 454 cases of lobar pneumonia due to *diplococcus pneumoniae*, is shown in the following table:

Type I, 151 cases.....	33.3 percent.
Type II, 152 cases.....	33.5 percent.
Type III, 59 cases.....	13.0 percent.
Type IV, 92 cases.....	20.3 percent.

The type determination of 100 cases of lobar pneumonia not treated by serum has increased the possibility of accuracy in prognosis. It was found in these untreated cases that the mortality in type I (which furnishes 33 percent of the cases) was 25 percent; in type II (which furnishes 33 percent) was 32 percent; in type III (which furnishes only 13 percent) was 45 percent; in type IV (which furnishes 20 percent of the cases) was 16 percent. It therefore appears that organisms of type IV, to which the great majority of the organisms found in the mouths of healthy individuals belong, have the lowest virulence. Organisms of type III, though they furnish the smallest percentage of cases, are much the more virulent; a patient so infected has a relatively bad outlook. Organisms of type I and II have relatively high virulence, furnish about 66 percent of the cases and about 62 percent of the mortality. An immune serum which has value in treatment has been found only for type I. So that the prognosis, as furnished by the figures just given, can be modified by specific treatment in only that type of case.

The importance of the determination of the type of pneumococcic infection is therefore clear. It may be of value to indicate the steps by which this type determination is secured. The sputum of the individual is secured in a sterile dish or bottle, and taken as promptly as possible to the laboratory. Direct films of sputum are stained to discover the kinds of organism present, other bacteria as well as pneumococci. A small portion of sputum is then washed three or four times in sterile salt solution to remove surface contaminations as far as possible, and an emulsion made by grinding it up with a small quantity of sterile broth or salt solution. This is injected into the peritoneal cavity of a mouse, where the pneumococci develop rapidly, and outgrow other organisms. The pneumococci invade the blood stream in from five to twenty-four hours, usually in six to eight, and as soon as the mouse appears sick it is killed, the exudate in the peritoneal cavity is obtained, and a macroscopic agglutination test is made against the immune serum of each of the four recognized types. This procedure can usually be carried out within 24 hours.

Antipneumococcus serum is not new in medicine. In 1891 it was shown that an immune serum could be produced, and that not only could an animal be protected against a lethal dose of virulent organisms, but that the disease in animals could be cured if the injection of serum was not too long delayed. For clinical purposes many attempts were made to produce an efficient immune horse serum, but the evidence at hand was not at all conclusive that the serum was of any practical avail.

After the discovery of the specific types of pneumococci, attempts at the production of immune sera for clinical purposes were renewed with better results. It was found, however, that, while specific immune sera could be produced for the immunologic identification for pneumococci, only one of these, that of type I, was efficient in the treatment of cases of pneumonia. The reason for this is not clear.

The method of production of the immune serum may be briefly outlined. Broth cultures of pneumococci twelve to fifteen hours old, with a minimum of autolysis, are killed by exposure to heat at 56° C. and injected into a horse daily for six days. This sequence is repeated, and after another rest period of

six days the blood is tested against mice. Unless sufficient immune bodies have been developed by this time, the injection of living bacteria is begun and repeated on three successive days. After a six-day rest period the blood is tested again, and the procedure repeated until a highly protective serum is obtained. The serum is then kept on ice in the dark for two months; it is then tested for sterility, and subsequently divided into suitable quantities for therapeutic use. When kept in the dark and cold, its potency is retained for an indefinite period—at least for two years.

The serum treatment, to give good results, should always be preceded by the determination of the type to which the organism belongs in the case of pneumonia under consideration. The loss of time is not significant if an early diagnosis is made. If the case belongs to type I, the administration of the serum offers an enormous improvement in the outlook for the recovery of the patient. Its use is not only justified, but imperative in all cases, except in those of young children who apparently bear the injections of serum badly, and in those cases in which evident signs of crisis or of resolution exist. Merely mild symptoms at the onset of the disease gives no assurance that the cases will not become a severe one. The use of the serum in the complications of pneumonia is not proved, and its use in these after the subsidence of the disease itself does not offer an outlook for cure.

The use of the serum in the quantities employed makes it a matter of importance to make every provision against possible anaphylactic shock. While the type of the organism is being determined, an intradermic injection of horse serum should be made to determine the existence of sensitiveness. If this should be present, successive doses of serum are to be injected subcutaneously, and later intravenously, at half-hour intervals, beginning with a dose of 0.025 c.c., which is rapidly increased. When 25 c.c. of immune serum have been injected, an interval of four hours is permitted to elapse, followed by injection of 50 c.c., and then at intervals of six to eight hours 100 c.c. An average of 250 c.c. were used in the case treated at the hospital of the Rockefeller Institute.

Following the injection of the normal dose of 100 c.c., an elevation of the temperature occurs within 20 minutes to one hour. This is termed the thermal fever. This is followed by a marked fall in the fever, perspiration, and an improvement in the general condition of the patient. A later rise of fever, with an accentuation of symptoms, may occur within six to eight hours, and this constitutes the signal for the repetition of the injection. In the cases with favorable outcome the temperature finally falls to normal and remains there, and the patient presents all the usual appearances of a crisis. The immediate results in the pathological condition consist in the failure of the disease to extend, with prevention or checking of the invasion of the blood by the infecting organism and the appearance of immune bodies in the blood. It is important to recognize that the quantity of serum to be used is variable, and that such a quantity must be given that the toxic bodies be more than neutralized, and that a medium be created that is unfavorable for the further growth of the organisms. No effect is produced on the rapidity of resolution in the lung, which must be watched and allowed to clear up in the usual way. On the other hand, there is no evidence to show that the use of the immune serum retards resolution. It simply does not keep pace with the signs of improvement in the toxic symptoms. No effect has been observed on the incidence of empyema, ear infections, and meningitis, though it may be said that no increase in the percentage of these focal infections has been noted. In 107 cases treated at the hospital of the Rockefeller Institute the mortality has been 7.5 percent, against 25 percent in cases not treated by the serum.

ORIGINAL ARTICLES.

THE STANDARDS OF HOSPITAL EDUCATION FOR INTERNS.

What May be Expected of the Hospital of Seventy-five Beds and Over—Clinical and Laboratory Service Which the Hospital Should Furnish.

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Hospitals have been established in their several communities to fulfill various needs and being organized for the fulfillment of certain specific functions, they are oftentimes so constituted as not to be a proper place in which to educate an intern. In the effort to obtain a competent course of instruction for an intern this fundamental fact must be recognized, namely, that, in justice to themselves, in justice to their communities, and in justice to the prospective intern, not all hospitals can assume the educational function. Hospitals having been developed with one function in view, it becomes an exceedingly difficult matter in many instances in view of the vision of their managers, the funds at their disposal, and the character of their medical and surgical staffs, to assume a second and distinct function.

In a discussion of this subject it becomes essential to consider first some of the general fundamental facts in regard to internship, and the first one in natural sequence is the minimum number of interns any given hospital should employ in order that it may give a proper and comprehensive service. As a rule it may safely be assumed that a thoroughly satisfactory internship cannot be given with less than four interns. For the internship to be thoroughly satisfactory this is an irreducible minimum.

A basic internship is grossly divided into four divisions, the laboratory service, the medical service, the surgical service, and the obstetrical service. The service should be a rotary one, the intern rotating from one department to the other. The service in the laboratory should be exclusively a laboratory service, with absolutely no other duty of any kind whatever, the intern being answerable to the chief of the laboratory and being entirely freed from

any responsibility to the superintendent or head of any other department during this period. The effort to combine the laboratory service with one of the practical services in a thoroughly satisfactory internship has proved on actual trial to be a failure.

There should be a minimum of twenty-five beds per intern in the hospital. This would allow a hospital with a capacity of seventy-five beds to be classified as being competent to give a reliable intern service, for the reason that while the intern is serving in the laboratory he is not encroaching upon the average of twenty-five beds, which average would still obtain as far as the other three interns are concerned.

In considering the education of the intern it is impossible to lose sight of the interest of the service of the hospital. The two are so closely interwoven that both must receive proper consideration. If the hospital service is not properly cared for, then it goes without saying that the hospital cannot do its duty from the educational standpoint to the intern. Consequently, if the hospital have the minimum of the above four divisions of service, there must be available an intern for each service. Not only is the service of the hospital incompetently carried on if there be not a sufficient number of interns employed, but this same difficulty must be faced where a sufficient number of interns have been originally employed and one has been discharged or has left the service. The usual course pursued by the hospital under these circumstances is the dividing up of the work of the departing intern among those remaining, to the disorganization of the hospital service itself and the interruption of the proper interests of the intern. Under these circumstances there is but one thing to do in order that the usual routine of the interns be continued uninterruptedly, viz., that the service deserted by the departing intern be left entirely without the service of an intern, the work to be supplemented by the staff in that particular department. It is far better, both for the hospital and for the intern, that each service shall in rotation be without an intern for two or three months, rather than that the whole system be disorganized. If it be contended that an intern having departed, his service must be assumed by others, the answer is perfectly apparent: what would be done if all the interns left? Surely no one would seriously consider closing the institution. An institution pretending to give an education to the intern which will exploit its interns in any such manner deserves to be left without any. The contract is a mutual one and the day has long since passed when labor can be exploited; surely intern service is not to be considered lower-grade service than any other labor.

This preliminary statement as to the number of interns and the division of services of the hospital is purely tentative as a working basis on which to consider the whole subject of intern education.

It does not mean that a good internship could not be obtained in a smaller institution or one organized on a somewhat modified basis. It does mean, however, that any hospital organized on a different basis or smaller in capacity of service is an exceptional hospital of its kind in which a satisfactory internship may be obtained. The genuine test point of the efficiency of such a contemplated service will rest entirely with the personnel of the medical and surgical staff and their willingness to give extra service and attention to the intern. I am sorry to say this is practically found in but exceptional cases. It is perfectly conceivable with a limited hospital staff composed of men who are practicing medicine scientifically, enthusiastic and imbued with the spirit of teaching, that an intern might obtain a very excellent service with an institution of even twenty-five beds and the proper scientific laboratory adjuncts. There are such institutions ranging from twenty-five to fifty or sixty beds in which there are two or three physicians working, one of whom is familiar with laboratory and x-ray routine, wherein a single intern is being most excellently instructed. It must be remembered, however, as already stated, that these institutions are so rare in comparison with the total number of hospitals existing that, in considering the general proposition of a proper internship, it is necessary to leave them out of consideration, merely noting the possibility of the exception. Such an institution being an excellent one today, a single member of the staff disappearing for one reason or another, the institution becomes an impossibility from the intern viewpoint tomorrow. It is not necessary to consider the service of larger hospitals by themselves, but like the very small ones, they may be dealt with as deviations from the standard. After all, they are largely to be considered as in the light of multiplications of a basic unit.

A prerequisite of an intern service is the organization of the hospital service. It may be stated in general that all special hospitals may be excluded from consideration, excepting as fulfilling a partial function. For instance, an eye hospital could only be given credit for a certain number of months on a general intern service. The same may be said of an obstetrical hospital, a children's hospital, etc., as well as those institutions which purport to admit all classes of patients, but which as a matter of fact on investigation are found to be confining 70 percent to 80 percent of their service to surgical work. Such institutions should be classified as special hospitals and dealt with on a basis of a limited amount of credit. In other words, no hospital can be considered as giving a thoroughly satisfactory intern service which does not have the four principal departments already named: medical department, including all the medical specialties; surgical department, including all the surgical specialties; obstetrical department; laboratory departments.

It may be stated at once that any hospital which has not a fixed and definite medical and surgical staff assigned to the work in the various departments cannot be considered as competent to give a satisfactory internship. This practically excludes all so-called open hospitals. It does not, however, exclude that type of hospital which has a fixed staff at least of the four departments named, but which in addition allows outside physicians to admit patients to their private room departments, it being thoroughly understood that such private beds are not counted as part of the minimum twenty-five to each intern. In the main, the so-called "one-man hospital" will have to be excluded, excepting, as already intimated, as in the class of exceptional institutions. The value of the service in such an institution depends entirely and absolutely upon the incumbent generally known as medical superintendent or chief surgeon. Not only is the organization of the staff in such a hospital fundamentally faulty for intern teaching, but it is a well-known fact that most such institutions are purely surgical hospitals and therefore are objectionable on this second ground and should be classified among special hospitals, being given a limited amount of credit for their service.

Returning then to our basic hospital—a hospital with the four departments already named, manned by a definite medical and surgical staff appointed because of their experience in the various lines of work to which they are assigned, with a minimum of seventy-five beds, with a minimum of four interns one for each department)—we are in a position to consider what may be expected from such an institution, first, in the way of equipment; second, in the way of instruction of the intern. In dealing with this element of the subject it will be very shortly realized that the problem to be solved is largely one of administration and not one of finance. Let no one be deceived in this matter. Little difficulty will be found with boards of managers when once the advantages and the necessities are properly brought to their attention; as staff members are found to realize the advantages opened to them and the demonstration is forthcoming that the service rendered is redounding to the advantage of the patients, the necessary funds will willingly be provided. The great and crying reform, sad to tell, is development of efficiency and intelligence of service by those already compensated—the superintendent and the staff members.

If the fundamental truth of the matter be grasped, it will become evident that the movement for the education of the intern means also a movement in the direction of the education of the staff, as well as of the superintendents. In this respect, where this movement has been put into intelligent force, great improvement is already noted. Where physicians had a minimum of laboratory knowledge and were difficult to secure, more and more are becoming avail-

able and not a few have given up the practice of medicine and are devoting themselves to the scientific side of the profession. Where primarily it was difficult to secure technicians, schools have sprung up for their instruction, and they are becoming more and more numerous. The development in the x-ray personnel has progressed with equal satisfaction, and few communities exist in which there are not one or more physicians competent to undertake and carry on this work.

Staff men in general are becoming more and more awakened to their responsibilities, both to the patient and to the intern, and are in consequence rendering more satisfactory service; the general improvement in the attitude of superintendents is marked and the influence on the attitude of hospital managers is shown by the sudden disappearance of many former inflexible superintendents.

EQUIPMENT.

First, as to equipment. The equipment of hospitals in general need not here be considered, attention rather being given to certain specific departments, namely, the laboratories (pathological and x-ray), the obstetrical department, the anesthetic department, the record department.

Pathological Laboratory.—This laboratory should be equipped not only for the conduct of ordinary chemical and microscopical clinical diagnosis (urine, gastric contents, feces, sputum, cerebrospinal fluid, transudates, and exudates), but also to conduct bacteriological and serological examinations and tissue work, as well as a competent amount of physiological chemical work. Equipment for the conduct of all this work may readily be obtained for a sum within the limits of a thousand dollars.

The head of the laboratory should be a physician competent to conduct all of the various tests conducted in modern clinical medicine under these various headings. If it be possible that he devote his full time to the work of the laboratory, it may be possible for him to do his own technical work. Ordinarily, however, a hospital of the size under consideration cannot afford or has not available such a man. The solution, therefore, lies in the employment of a technical assistant. A laboratory technician is easily possible to any hospital which may claim to have the possibilities of intern instruction. Such material may be drawn from among trained nurses or young women having had a high school, or, better still, a college education. Five or six months in attendance upon a school or laboratory instructing technicians, would prepare the technician to perform competently all of the technical work of such a laboratory as is under consideration, even including Wassermann work. With such an assistant working full time in the laboratory, it would be necessary for the physician at the head of the laboratory to devote

but a few hours a day to interpreting the results and giving instructions for coming work. The services of the technician would cost the hospital not more than from \$50 to \$100 a month. Her education can be secured for an outlay of several hundred dollars, involving an expenditure of time of from five to six months. The services of the physician at the head of the laboratory may be arranged either on the basis of fees for the work done on private patients, or on the basis of fixed compensation, the hospital absorbing all fees. The latter is far the better arrangement. Such a laboratory conducted on strictly business principles can in most instances be made to pay the cost of upkeep and in addition at least the salary of the technician.

The plea has often been advanced that a physician with competent knowledge of laboratory work is not available. This is a real difficulty. However, if opportunity be not given the physicians who have a moiety of laboratory knowledge to utilize and increase that knowledge, the time will never come when there will be any improvement over the present status, and two decades hence we shall be just as deficient in competent laboratory men as we are at present. It is possible in communities containing two or more hospitals that a physician may give his divided attention among the several institutions. Where a community may not have available a physician familiar with the findings of the laboratory, an arrangement may be made with some nearby laboratory by which the tissue and other work, after being prepared by the technician, may be submitted to the head of this laboratory for his interpretation. A laboratory organized on the above plan is perfectly feasible and within the limits of possibility. If an arrangement be attempted whereby a neighboring or city hospital perform the work, the invariable result is that the pay patients receive the benefit of the work, the ward cases being in part or more often entirely neglected in this respect, and the intern loses both the experience and the influence of the environment.

Roentgenologia Laboratory.—The x-ray laboratory may be completely equipped for picture work, treatment, and fluoroscopic work for sums ranging from \$1,500 to \$2,500. The personnel of this laboratory is generally easily provided for and compensated on the basis of the percentage of fees charged and collected for the work performed for those able to pay. The proper system is that the hospital render all bills and collect all moneys and pay over to the head of the laboratory such percentages as have been agreed upon. This division should provide a sufficient percentage for the hospital in order that the laboratory be properly kept up. The general average arrangement is 40 percent to the hospital and 60 percent to the head of the department, which arrangement seems to be satisfactory where it has been established.

Again, as in the case of the pathological laboratories, the cost of the x-ray laboratory to the institution is in exact proportion to the competency of the business management of the institution, and, provided the deficit in either department is not a large one, there should be no cause for complaint that the laboratories are an expense to the hospital. The upkeep and personnel of the kitchen, the upkeep and personnel of the boiler rooms, the upkeep and personnel of the superintendent's office and every other department of the hospital are an expense to the institution and are provided for from the general funds, and there is no reasonable theory that can possibly be advanced that would exclude the scientific departments from their proper participation in the general budget. If, then, the cost of these departments in one institution is more than in another, the business acumen of the individuals conducting the former institution should be critically examined. It may be stated and should be made fundamental that the institution that cannot afford the proper scientific departments as herein laid down has no claim whatever to an intern and has no right to consideration in considering the intern proposition. Things worth having in this world are rarely obtained for nothing. If the hospital expects the benefit of the service of the intern, then it must pay for it, and the payment asked in this connection is the proper opportunity and education of the intern. The organization as suggested is perfectly feasible for any institution of seventy-five beds or more, and any plea to the contrary is a specious one and should be disregarded.

Records.—This department should have as its head some proper employee of the institution upon whom shall center the responsibility for its intelligent conduct. A system should be developed by which records from all the several departments of the institution, including the laboratories (both pathological and x-ray) shall automatically come to this department in order that the responsible head may be in daily touch with the facts as to whether or not individuals throughout the institution responsible for making up these records are consistently attending to their duties. No patient should be discharged from the institution without the facts as regards his or her records having been checked up in the record department and any deficiencies in this respect promptly rectified. The system should be so developed that it shall not be possible for any single department in the hospital to neglect this most important part of its functions without the neglect being promptly noted. The system should be comprehensive enough to provide by cross-indexing that one may be able to proceed with equal ease from the record room (in the case of any individual patient) to the specimens, slides, and records kept in the pathological laboratory and to the plates and records kept in the x-ray laboratory as well as to start from the laboratory records in these laboratories and to proceed promptly to the proper records in the record room.

Obstetrics.—The obstetrical department should be a distinct and separate entity. The department should contain a properly equipped delivery room, as well as a nursery. The head of this department should have one or more properly qualified assistants in order that a responsible physician may be present at all deliveries.

Anesthetics.—The anesthetic department, being an adjunct to the surgical service, belongs properly to and is generally provided for in the operating suite. The department should be organized on the basis of a responsible head, consisting of one of the surgical staff, together with an assistant anesthetist who shall be largely responsible for the actual giving of the anesthetics and the teaching of the intern. Such an assistant may properly be a trained nurse who after her training has been especially educated in the giving of anesthetics. The wage of such an assistant would be largely that of a trained nurse employed in the other departments of the institution, increasing in amount as her services become more and more valuable. Such an assistant in the smaller institutions is available for other services in the nursing department at such times as she is not fully occupied with the anesthesia.

DUTIES OF THE INTERN AND HOSPITAL STAFF.

Records.—The efficient keeping of records of the cases admitted to the house service is basically essential to the education of the intern. It is not out of the way to estimate that 30 percent of the benefit derived by the intern from his education in the internship is involved in the record-keeping, and the proper conduct of this function should be remorselessly insisted upon. No service of the intern can be considered competent which does not take into consideration history-writing. It is only by the intern's actually noting on the history sheet the history of the patient, the physical findings, and the conclusion arrived at as to diagnosis that the chief can obtain a competent idea, first, of the basic knowledge started with by the intern, and then of the progress he may be making, and consequently the degree to which he may be trusted. On the admission of a patient to the wards of the hospital it becomes the primary duty of the intern promptly to see the patient, to take the history as well as the physical findings, and to note them carefully upon the proper sheets. No excuse should be accepted for failure to perform this function, and the intern who neglects it should be promptly disciplined.

The notes thus taken should be available at the bedside when the visiting physician makes his first visit. In making his examinations the visiting physician should have in hand the findings of the intern, primarily note the results, and, during his investigation should compare and check up the intern's findings with his own, calling the attention of the intern to the discrepancies, and having

him re-examine for certain points where necessary. The future conduct of the case, operative or medical, should consist in the discussion with the intern of the benefits of the treatment primarily applied, of the necessities for any change, and of the results looked for by such changes—all this in view of the actual notes as to the progress of the case made by the nursing and intern departments. As a routine, if the history is not prepared by the intern and ready for his chief, it should be the duty of the chief to decline to examine that patient (excepting in an emergency) and demand of the superintendent that the intern drop anything at which he may be engaged and proceed promptly to the taking of the history. Where it is understood that such action will result, this type of neglect will rarely occur in that institution. In no other way can the staff member obtain a competent control of the intern's service.

The history sheet of the intern should contain the O. K. of the visiting physician, and the fact that it is missing should be sufficient evidence to the record department that the staff member himself is not performing his proper duties either to the patient or to the intern. After the physician's attention has been called to the matter (if the offense be frequently repeated) the fact should be promptly transmitted to the superintendent and through him to the board of directors for their information and proper action. Any hospital which does not secure such service from its staff members fails administratively and cannot pretend that what they are being asked to do is a hardship—unless it be considered a hardship by the board of managers and the superintendent that they be called upon to give intelligent thought to the responsibilities which they have voluntarily not only assumed, but in most instances sought. The intelligent conduct of the history work on the part both of the intern and of the staff is an index to the competency of the work being performed on the patients, and slovenliness and neglect in this department is sufficient cause for the rejection of any institution in considering its availability for conducting intern education.

Laboratory Work.—In the laboratory department there should be demanded of the intern during his service that he first witness and then carry out under the guidance of the laboratory workers all of the tests performed in the laboratory; that he be given more and more responsibility as his experience warrants in making the simpler clinical tests such as the chemical and microscopical clinical work; that the tests he is performing in the advanced work be carried on concomitantly with the work done in the laboratory and his technic and results checked up with the work of the technician or the head of the laboratory. Complaint has been made that the results of this more advanced work cannot be relied upon when done by the intern. It is neither desirable nor necessary that it should be. He is there as a student, and as the work is being performed in the laboratory, the material is perfectly available for

him to do it a second time and at the same time, in order to get the benefit of the check-up. This is certain: that the intern, having learned the laboratory methods in his school, having gone into his intern service and seen nothing of it as applied to the practice of medicine, having not carried out any of the technic himself, will leave that institution imbued with exactly the same ideas of the scientific practice of medicine as he has acquired in his environment, and it will be but a short time before the majority of such interns degenerate into practicing medicine on the basis that it was practiced by their chiefs in the hospital. If, for instance, an intern in his hospital service has seen but two or three instances a week in which the Wassermann reaction has been made, he will leave that environment lacking a proper appreciation of the importance of Wassermann work in the practice of medicine and will conduct himself accordingly in his own future practice; and so in regard to all other tests. It is often stated that interns will not do this advanced laboratory work in the practice of medicine. This is true, and it is hardly desirable that they should. It is desirable, however, that they should carry with them into the practice of medicine the benefits of the stimulus of a scientific environment and a sufficient knowledge of the technic of the various laboratory methods in order, first, to know the importance of their use, and, secondly, to be able to judge of the competency of the men whom they employ in future to carry out these tests for their patients.

In the x-ray laboratory it should be one of the obligatory services of the head of the department to see that the intern accompany his patient requiring x-ray work to the laboratory; that he see and be instructed in the dangers of too frequent, too close, and too intense application of the rays; that he be made familiar with all the technic of the picture-taking and the treatment; that he be taught thoroughly the reading of the plates and the difficulties of interpretation; and that he take away with him a comprehensive idea of the development work.

This touches pertinently upon the responsibility of the staff members, heads of pathological laboratories and x-ray laboratories, all of whom not infrequently object to the trouble created for themselves personally by the presence of the intern and the necessity of his instruction. In employing such heads the hospitals are warranted in demanding under contract that this be an essential portion of their duties.

Obstetrics.—The ordinary service in the obstetrical department is an utterly incompetent one both for the benefit of the patient and for the instruction of the intern. It cannot be counted as a difficulty to any hospital, large or small, that it administratively sees to it that its staff perform its duty. The ordinary situation existing in the obstetrical department is: an obstetrician in charge. Patients applying are seen in the dispensary or receiving ward by

the intern and admitted to the house at or about the time the patient falls into labor; or the patient is seen by the obstetrician in his own office and referred to the hospital to be admitted on some later date. Within a short period after the patient is admitted to the hospital, labor begins (she having been seen or not by the obstetrician) and she is sent to the delivery room. The chief is called on the telephone by the intern and notified of the fact. After a short talk, it is mutually decided that the case is a normal one and the intern is instructed to "go ahead." In case of subsequent difficulty and necessity of instrumentation the obstetrician is again summoned and then comes to his patient. In moderate-sized and small hospitals and only too frequently in large ones this is the sum total of the service.

Such service is utterly inadequate and incompetent from every point of view. It does not conserve the interest of the patient; it does not protect the interest of the hospital; it does not educate the intern—in fact, it is a detriment to the intern.

No hospital, however small, except in emergency, should admit an obstetrical patient to the wards and transfer her to the delivery room without her having been first submitted to all of the proper prenatal examinations by the chief or one of his responsible assistants. If there be a prenatal clinic (which should always be the case), the intern in attendance should in every case, either in the clinic under the eyes and checkup of the chief or assistant, make the prenatal examinations; or if the case be admitted to the house primarily, the intern should make this investigation, note his findings accurately on his obstetrical sheets, and, excepting in the case of emergency, such patients should not be admitted to the delivery room until the chief or his assistant has checked up the findings of the intern and called the attention of the intern to his mistakes, if any be found.

In no instance, excepting in emergencies, should the intern be trusted to conduct the work of the delivery room without the presence of a responsible physician, be the case a normal one or otherwise. It is important for the education of the intern that he be competently instructed repeatedly in the conduct of the normal case. Without a competent knowledge of the conduct of the normal, he is utterly unfit to decide as to the abnormal. For the hospital to tolerate that the question of normality or abnormality be settled over the telephone wire between the responsible physician and the intern is such a demonstration of incompetency in the way of management as is uncalled for in any institution which asks for consideration as being competent to give an intern service. The whole conduct of the obstetrical department of the hospitals of the country must be reorganized on the proper basis, and this should be one of the prime demands of anyone evaluating the service of a hospital for intern teaching.

Surgical Work.—In the surgical departments it may be asked of the hospital that it enforce on their surgeons that the intern at least be given a minimum opportunity for education of a type which will devote the first third of his service in the surgical department to the duties of the position of a second assistant; the second third to the duties of a first assistant and in the final third that he be given an opportunity by the surgeon to perform some of the less serious operations himself, with the surgeon assisting and directing him.

Anesthesia.—The intern is a student of anesthesia and cannot be considered in the light of being competent to be trusted in this service by himself as long as he remains in the hospital. His service in anesthetics usually occurs during his period in the surgical department. In the main, the paid anesthetist must be looked to to give the anesthesia, having the intern with her and instructing him up to the point she considers it advisable to trust him with the cone. Excepting in emergencies, she should be present always when the intern administers the anesthetic throughout his full term of service in that department. It should be her duty, when she is not herself administering an anesthetic, carefully to watch and instruct the intern, not only that he may avoid any complications, but that she may be on hand promptly to aid and to instruct him should any occur. The usual hospital system of having one of the staff or the paid anesthetist instruct the intern for a few days or a week and then turn him loose on his own responsibilities thereafter to administer the anesthetic as best he may is a pernicious one and one to be no longer tolerated. The private patients and the more serious ward cases should be handled by the anesthetist herself, and the intern should be confined in the acquiring of his experience to the uncomplicated ward cases.

As a minimum, it may be said that this rough outline of intern service is perfectly feasible in any hospital of seventy-five beds conducted by an intelligent board of managers, with a competent superintendent and with a staff of medical and surgical men who are worthy of holding such positions. It should be and can be demanded as a minimum, and without it no competent internship will ever be secured.

RICKETS AS AN ETIOLOGICAL FACTOR IN THE PRODUCTION OF WEAK FEET IN CHILDREN.

BY ALEXANDER E. HORWITZ, A.M., M.D., F.A.C.S., St. Louis.

Rickets as an etiologic factor in the production of weak feet in children has not frequently been considered. Little attention has been paid, as a rule, to rachitic children in order to prevent and correct foot weakness. In older children in whom a foot defect has been noted, some method of correction has been instituted, but in the infant and the child beginning to walk it is neglected.

If we were to consider rickets as a constitutional disease, leading to foot weakness and disturbance, at times resembling true paralysis, we would render humanity a service. If we were to regard rickets much in the same light as poliomyelitis, and remember that foot disturbance both in form and function must result, much as we remember that foot deformity in poliomyelitis will and must result if the limb were left to itself, a different attitude would be assumed by the practitioner and even by the pediatricist, and more useful feet and less weakened feet in children, and consequently in adults, would result. A larger amount of weak feet exists than is the general supposition, and to leave rachitic children alone, with the idea of self-correction, is not wise.

In rickets, as in poliomyelitis, the muscle weakness is not symmetrical, and the action of the synergists is disturbed. While, as in poliomyelitis, gravity plays an important part, in rickets weight-bearing is the controlling factor. In the former the deformity may take place before the child is able to walk; in the latter it does not take place until walking has been begun. This ought to give us a better opportunity to prevent deformity.

This deformity in rickets is just as easy to foretell as in poliomyelitis. In a limb weakened by rickets the child persists in the walk used by an infant—that is, the legs are widely separated to give a larger base for support. In this attitude, if prolonged, the feet are naturally abducted and pronated. This in itself leads to deformity of the leg.

Whether the leg in rickets shall be bowed or knocked depends on this early walk of the child. There are, however, two strong predisposing factors. One is that in the female an approach of the knees is the normal, predisposing to actual knock-knee. Another is the normal slight lateral bowing of the tibia, predisposing in some to bowlegs. Where the tendency to knock-knee does not exist,

the bowing has the ascendancy. Added to this the separation of the legs and the eversion of the feet in the gait of the rachitic child, the knocking would be exaggerated.

Why the feet are in eversion we will consider later. The points, therefore, to bear in mind are that rickets produces a muscle weakness much as poliomyelitis does, and that certain deformities can be foretold, and prevented if proper methods were instituted.

CAUSES OF WEAK FEET IN GENERAL.

1. In children the causes of weak feet are numerous. I will not attempt to attribute them all to rickets. The child beginning to walk must be studiously watched. It will be noticed that it begins to walk with the feet widely separated, to obtain a wider and more firm support. This should not be allowed to persist, even in a healthy child, beyond a reasonable length of time. The feet are thereby weakened. This weakness is produced by the undue tension placed upon the tibial group of muscles and the contraction and shortening of the peroneal group.

2. There is a type of congenital weak foot, resulting either from a mild valgus or varus, without the accompanying equinus or calcaneus. The valgus is the more common, which is in reality a mild calcaneovalgus, with the preponderance on the valgus.

3. Poliomyelitis leads to weak feet. Here they are produced by
 - a. Paralysis of the tibial group.
 - b. Complete paralysis of all groups, but, where a tendency to knock-knee exists, carrying the feet outward.
 - c. Position and gravity in feet completely paralyzed.
4. Congenital or late hereditary syphilis.
 - a. Muscle weakness is here frequently seen.
 - b. Peroneal spasm, simulating the peroneal type of progressive muscular dystrophy, is frequently met with. This leads to eversion of the foot upon weight-bearing, with weakening of the soft tarsal structures.
5. Rickets. Weak feet are produced by
 - a. Weakness of muscles and relaxation of ligaments.
 - b. Bowlegs.
 - c. Knock-knee.

Rickets, as we know, is a disease affecting not only the skeletal structure of the body, but one also affecting to a marked degree the muscle and ligamentous structures. The bone changes found in rickets are due both to an absorption and lack of deposit of lime salts. The effect on the muscle cells are of like nature.

Sitting Posture.—The rachitic child early adopts a sitting posture detrimental to its future muscle development. We know that, as a general rule, the flexors and adductors are the stronger in any synergist group. The natural sitting posture of a healthy child is that

of the legs crossed and feet inverted. A rachitic child does not conform to this rule. It will be observed that it sits with the legs and feet abducted. In the foot this tends to relax the inner group of muscles and weaken them.

The softening and broadening of the tarsal bones, exaggerated by weight-bearing, has its effect on the tarsal ligaments. These, in turn, become stretched, producing a flail weak foot. In weight-bearing the scaphoid is lowered; the astragalus is permitted to glide inward and downward; the plantar fascia is stretched and weakened; the entire inner side of the foot is thrown from its proper poise; the tibial group becomes stretched; the unantagonized peroneal group becomes tense, and in some cases even spastic, holding the foot in a valgus position.

6. Slight eversion of the foot is a position of comfort while at rest. To the impressionable mind of the child, its subconscious reasoning leads it to persist in this position of comfort at other times—that is, while in action. It is perhaps this idea which led the early educators to insist on both child and adult assuming this position of eversion for the foot while at rest. It gives a broader base of support both in sitting and standing. This position, if persisted, is a strong factor in the production of weak feet. It should be discouraged.

KNOCK-KNEES.

In any deviation of the weight-bearing or gravity line of the body, compensations result which aim to restore the equilibrium as far as possible. In the spine the normal curves change to maintain the body poise. The hips and knees assume a peculiar attitude to assist in this change. In disturbance of the knees the feet are the main factors in this changed attitude. In genu valgum the feet, even where they are not, *per se*, affected by the rachitic changes, are carried out and pronated. This is due to the inward rotation of the knee. In early cases of knock-knee flat pronated feet are the rule (Fig. 1). This, however, soon changes. This attitude and position are both awkward and impossible. There is an unconscious attempt on the part of the child to correct both this awkward posture and strain on the feet. We then come to the second stage of the feet in this knee condition. This will be noticed in mild cases. The child begins to stand with the legs somewhat separated, the feet mildly inverted, the large toe spaced inward from the other toes (Fig. 2). The third, final, stage of the foot in this knock-knee condition is a marked intoeing (inversion of the foot), the big toe widely separated from the other toes and the long arch of the foot low (Fig. 3). This separation of the big toe is in some cases very marked, leading to a spreading of all the toes, producing a foot remarkably primitive in appearance. This is in striking contrast

to the rachitic changes seen elsewhere. That it is not normal to the child is shown by the fact that in those cases where the genu valgum is not of equal degree in both legs, the above-mentioned



Fig. 1.—Knock-knee. Feet out, toes out.



Fig. 2.—Knock-knee. Feet out, toes in.

primitive foot is more perfect in the leg where the knocking is more marked. It is thus a compensatory change, approaching the normal.

This intoeing serves another purpose. It is more than an attempt

to correct an awkward posture. Knock-knee disturbs the normal line of body gravity and body support. A realignment is called for. The feet are the mobile points of the limbs, the only points



Fig. 3.—Knock-knee. Feet in, toes in.



Fig. 4.—Bow-leg. Feet in, toes in.

where a readjustment can take place. By inverting the foot and pointing the toes inward the tibias are rotated inward and the knees are forced apart.

Knock-knee carries the foot outward, stretches the tibial group, weakens it, and contracts the peroneal group. The former, the stretching of the tibial, is the more serious in its consequences.



Fig. 5.—Bow-leg. Feet out, toes in.



Fig. 6.—Bow-leg. Feet out, toes out.

If this attitude is *long persisted* in, the natural attempt at self-correction, by unconsciously toeing in, is hindered or rendered impossible. When we note a knock-knee of some standing and an

everted foot with it, we must recognize the muscle weakness, and direct our attention in the treatment to this more than to the arch condition.

Well-developed flexors assist the tibials in adducting the foot. Weak flexors (stronger extensors) assist the peroneals in abducting and weakening the foot. Where the toes grip the ground, correction of knock-knee is going on.

In nearly all cases of early knock-knee the child stands with the left foot in line with the knee deformity, but with the right foot in the beginning corrected position—that is, inversion (Fig. 7). The musculature even this early begins to exert itself and shows the possibility for training.

Our investigations and those of others tend to show that knock-knee is more common in both boys and girls than was formerly believed. It was the common belief that knock-knee was a feminine and bow-leg a masculine deformity; the former because of the tilt of the feminine pelvis, the latter for no determined cause. Intelligent use of the diaper, doing away with the clumsy bundling between the legs, is probably a factor in the diminished percentage of bowlegs.

A prominent obstetrician remarked to me that all children, in beginning to walk, are bow-legged, and that this condition disappears when the legs and musculature are strengthened. With this idea I will take exception; it does not exist. One seeing a large number of hospital children can hold that view, but in private life and among healthy children this does not hold true.

DISTURBANCE DUE TO BOW-LEG.

Weak Feet Resulting From Bow-leg.—When weight is thrown upon a bow-leg, the first position of the foot is in conformity with the general bowing (Fig. 4). It will be observed that the child stands with the inner border of the foot slightly elevated. With increased weight, this soon changes; it is an impossible attitude. The child of its own accord swings the foot outward (Fig. 5). This gives it a more stable base and also tends to correct the knee deformity—this latter unconsciously.

Where the bowing is marked, an inward curve is produced just above the inner malleolus, which exaggerates the pronation. This latter curve is produced directly by the attempt of the child to gain a firm foothold. It is difficult of correction. It is usually noted on the left leg, possibly because this limb is the weaker and the yield is the greater. In knock-knee the pronated foot is the primary, and the tendency is to recede from it. In bow-leg this pronation is the secondary and final stage, and therefore the more lasting and serious. The tendency here is to increase in severity. Structural changes frequently result. The tarsus is distorted, the

peroneals become tight, shortened fibrous bands, and the tibials become stretched, relaxed weak fascial bands.

Effect of Weight-Bearing on Feet Weakened by Rickets.—In those children where no knee or leg distortion exists, but where the structures of the foot are involved, the causes leading to foot weakness are present long before weight-bearing is begun. These changes we have found to be:

1. A disproportion in the diameters of the foot, the ratio being in favor of the long diameter.

2. A disproportion in the size of the foot to the length of the limb.

This means that the foot in a rachitic child is smaller in its relation to the length of the limb and size of the body, and is narrower in its relation to its own length. It means, further, that the foot has a weaker musculature, that it affords a less firm base of support to the body, and is in itself unable to sustain the body weight—all the elements of a weak foot. In a foot of this type the ligamentous structures participate. This produces a lax interosseous framework and a flail foot.

When weight is thrown upon a foot in itself (1) weak and flail, (2) too narrow to sustain the column of weight, and (3) too small to sustain the entire body weight, but one result can ensue—it must yield to the superimposed pressure and deviate from the direct line of force applied. As greater pressure is normally thrown on the inner side of the foot, and the yield to normal pressure is greater on this side, the inner side is therefore the first to yield under these abnormal factors. The tarsal ligaments relax, the tarsus collapses, the tibials are weakened, the peroneals contract, and the foot everts and pronates.

SYMPTOMS.

We will divide these symptoms into their etiology.

1. Those caused by knock-knee.
2. Those caused by bow-leg.
3. Those caused by weakness of foot structures.

We must not forget that in 1 and 2 there are also present elements of 3.

1. *Knock-knee.* a. The child with knock-knee early begins to turn the foot out and falls frequently. A fullness appears over the internal malleolus; the arch is depressed; the toes point outward; the foot is flail; a depression is noted over the anterior portion of the astragalus; exhibits a tendency to rotate the entire limb outward (Fig. 9); weight borne on inner side of foot.

- b. Foot assuming a straight position; arch exaggerated; toes straight and slightly flexed; big toe separated from the rest; internal and external malleoli of equal prominence; depression over astragalus absent; weight borne on both sides of foot equally; limb

shows no tendency to outward rotation; falls less frequently (Fig. 8).

2. *Bow-Leg*.—a. Foot inverted to conform to the general bowing



Fig. 7.—Knock-knee. Left foot weak and abducted, right foot strong (straight), big toe abducted and widely separated from others.



Fig. 8.—Knock-knee. Feet everted, toes inverted, arches good.

of the entire leg; stands with legs widely separated; at this stage does not stand freely alone; when it begins to stand alone, the feet become pronated, toes turn outward, arch depressed, inner malleolus

becomes prominent, legs less widely separated; toes not flexed (Fig. 6).

3. *Weak Foot Without Knock-knee or Bow-Leg.*—Here we have a weak, pronated foot similar in all respects to a congenital flat foot or to marked flat foot of paralytic origin. The findings are those of the first stage of knock-knee or of the final stage of bow-leg.

In genu valgum, when the corrective is first assumed, it will be noted that the right foot is the first to begin it. The contrast between the right and left foot—the one in marked pronation, the other straight—is very marked; also, the cramped toes in the weaker left and the strong separated toes in the stronger right. This condition in the right foot in early knock-knee strongly resembles the condition seen in the first stage of weak foot in bow-leg. The secondary fair arch in the self-corrected foot of knock-knee is formed by the flexion of the toes and adduction of the anterior portion of the foot.

In examining the feet in rachitic children, they were divided into three groups.

1. Children not yet standing, 1 to 18 months of age.
2. Children beginning to stand alone, 18 months to 2 years.
3. Children able to walk, above 2 years.

One hundred children were examined at the various institutions. They were not selected, but taken in order. Of these all showed signs of rickets.

FINDINGS.

A disproportion in the size of the foot to the leg was noted.

Weakness of the tarsal ligaments and muscles of the foot. This allows the foot to be thrown into a position of valgus when the weight of the body is placed upon it in attempted standing or walking. This in turn throws the knees together in mild and beginning knock-knee. This may account for the large number and almost universal condition of knock-knee seen among these children.

In other children where bow-legs are seen the pronated and weak foot is the result of the disturbance in the leg and not its cause. In these children the feet are seen to be firm and fairly well developed.

Bow-legs are usually seen in those children who have been walking for some time; knock-knee in those just beginning to walk.

In knock-knee the big toe stands away, even in those cases where no other compensation exists. This may be called the first stage of compensation. It approaches the normal unshod foot in the primitive.

A normal healthy child, on standing and attempted walking, brings the toes in and grasps the ground with the toes. This is seen even where the knee deformity exists—primary pigeon toe—

(Fig. 10). Where a knee deformity exists, the toes are in secondary pigeon toe condition, but the arch is low and foot pronated.



Fig. 9.—Knock-knee. Tendency to rotate entire limb outward.



Fig. 10—Right to left. (1) Feet inverted, arch good, toes flexed. (2) Feet less inverted, arch fair, toes flexed. (3) Feet everted, arch low, toes not flexed (straight).

We have been taught to believe that knock-knee and bow-leg become manifest when the child begins to stand and walk. In a series

of 20 children from another institution we found 7 cases of mild bow-leg in 10 children under 6 months, and 6 cases of bow-leg in 10 children between the ages of 10 and 12 months.

As a general rule, we find the combination of knock-knee and weak foot. In many of these children the degree of weak and abducted foot is too great in proportion to the knee disturbance, so that we are forced to the belief that the foot deformity is either independent or the precursor of the knock-knee. This may account for the rather late walking in these children. The average walking age among these children is 2 years.

In a series of 100 cases of children between the ages of 1½ to 2 years exhibiting evidences of rickets, the following were found:

		Male	Female
1. Walking.	40	28	12
2. Standing.	24	20	4
3. Beginning to walk.	36	24	12
Total.	100	72	28
4. Knock-knees.	64	48	16
5. Bow-legs.	28	24	4
6. Weak feet.	8	0	8
Total.	100	72	28

7. Of total of 72 males, 48, or 66 2/3 percent, were knock-knees.
24, or 33 1/3 percent, were bow-legs.

8. Of total of 28 females, 16, or 57 1/7 percent, were knock-knees.
4, or 14 2/7 percent, were bow-legs.
8, or 28 4/7 percent, were weak feet.

These children were not selected. They were the first 100 which showed evidences of rickets:

9. Knock-knees, 64 percent; bow-legs, 28 percent; weak feet, 8 percent.

We had long been taught to believe that bow-legs was much more common, especially in males. These figures prove the contrary:

10. Of the total of 64 knock-knees, we found: feet everted, toes out, 8, or 12½ percent; feet everted, toes in, 44, or 68¾ percent; feet inverted, toes in, 12, or 18¾ percent.

11. Of the total of 28 bow-legs we found: feet inverted, 16, or 57 1/7 percent; feet everted, 12, or 42 6/7 percent.

TREATMENT.

a. Weak foot without knee or leg deformity.

1. General and systemic.

2. Local.

a. To strengthen all muscle groups.

b. To restore synergistic action.

c. To correct deformity.

a. Massage, passive manipulation, heat (dry), encourage use of limb.

b. In walking children raise the inner side of the shoe to contract the tibials and stretch peroneals.

Do not use soft shoes. Where possible, have a shoe constructed which will hold the foot in an adducted position.

c. Where deformity is marked, treat it like a congenital flat foot by overcorrection in a series of plaster or paris bandages. Brace, holding the foot in an inverted and adducted position. Avoid metal plates when possible. Use cork pads.

ACIDOSIS AND ITS OCCURRENCE IN CHILDREN'S DISEASES.*

By ROLAND C. CONNOR, M.D.,

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The term "acidosis" is used to define a morbid condition of the blood, not of acidity which, of course, is incompatible with life, but rather a reduction of the normal alkalinity of the blood. Such reduced alkalinity inhibits the compensatory mechanism of the body tissues in their normal effort to eliminate acids as fast as they are produced by destructive metabolism.

Of late years the term has been loosely used, and probably many pathological conditions are credited to it for which it is not responsible. Formerly acidosis was thought to exist pathologically only in such conditions as cyclic vomiting of children, coma of diabetes mellitus, vomiting of pregnancy, after certain poisons such as phlorizin, or following chloroform narcosis and accompanying lesions of the central nervous system.

When we speak of "acidosis," as a general term, we mean in all its forms—viz., the accumulation of acetone bodies in the blood from the catabolic formation of organic acids, and also the accumulation of sodium acid phosphate from faulty excretion of this substance by the kidneys, as shown by Howland and Marriott,¹ who found in infantile diarrheas without acetonuria that the acidosis was caused by accumulated excess of sodium acid phosphate. The condition is brought about in several known ways, as determined by Crile² and others, who proved that by excision of the adrenals or liver a pronounced acidosis was produced before death; hence it is reasonable to suppose that interference with the functions of either gland would result in acidosis as a symptom. Also Higgins, Peabody, and Fitz,³ experimenting on normal individuals with carbohydrate-free diets, produced acidosis in varying degrees in all cases.

Stillman's observations on diabetics show that in most cases the existing acidosis disappeared while they were on fasting treatment, even in cases verging on coma. This would seem contrary to our expectations and to the theory that acidosis complicating pernicious vomiting of pregnancy, infantile diarrhea, and exhaustive fevers is probably due to an excessive demand on the patient's tissues to supply nutrition.

*Proceedings of the Medical Association of the Isthmian Canal Zone.

¹Howland and Marriott, *Bull. Johns Hopkins Hosp.*, XXVI, No. 301.

²Crile, G. W., *Annals of Surgery*, LXII, No. 3.

³Higgins, Peabody, and Fitz, *Jour. Med. Research*, XXXIV, No. 2.

While the etiology is clear in experimental cases so far as it goes, there remains a class of cases in infants who to all appearances are perfectly nourished and normal when stricken. I grant these are few, but they do occur, and pathologically have shown at autopsy only a fatty degeneration of the kidneys and liver, or edema of the brain.

We have so far been unable to get an autopsy on any of our fatal cases. Those we have seen have all been in white children, and as yet no colored children under our observation have been attacked. I have thought this possibly due to the negro women never failing to supply a sufficiency of sugar and barley or oatmeal water to their children on the first occasion of illness. So far as I can determine, the character of the nourishment has not been a factor. In one infant, 11 months of age, the illness began on the ninth day after weaning. It was fed on pasteurized cow's milk from a local dairy. The pasteurization was done at home by the mother, who had had no experience in such preparation of milk. The illness began by malaise, vomiting, and refusal to take regular feedings. I was called to see the child on the second day of illness. The stools were normal and well digested. There was vomiting, restlessness, and respirations were out of all proportion to temperature, which was 100° F. The liver was enlarged and there was a distinct acetone odor to the breath. I immediately discontinued the milk for 24 hours and ordered a mixture of equal parts of 4-percent solution of sodium bicarbonate and barley water. At the end of 24 hours, as there was no improvement, I referred the case immediately to the hospital. A test of the urine for acetone showed more than 2,000 milligrams per liter. Energetic alkaline treatment was begun per mouth, subcutaneously, and by bowel. As the weaning had been recent and the mother had breast milk, the child was given the breast every three hours. On the third day the urine showed 3,800 milligrams of acetone per liter, and on the fourth day 2,500 milligrams per liter, with some improvement in the general condition, although vomiting remained a prominent and distressing symptom throughout the illness. This slight improvement lasted for only three days, with the return of the symptoms plus a high temperature, and death in convulsions with temperature of 106° F.

Although alkalies were continued in large amounts, the acidity of the urine in this case was apparently never diminished, and the acetone estimation never showed less than 2,000 milligrams per liter, with diacetic acid present. In this case there was no clue to the diagnosis of the primary disease, if one was present. Meningeal irritation was suspected from the beginning, but was never exhibited until just before death.

The occurrence of acidosis in mild epidemic form in children has

been reported by Metcalf,¹ of Concord, N. H., in 1915, and more recently, this year, in Boston, Mass. Metcalf reported a series of 100 cases in children of from 1 to 13 years of age. No causative factor was discovered or proved. No special dietetic error could be determined. Eighty-four percent of the cases gave no history of previous similar attacks. Seventy percent were complicated by or were just recovering from some infection of the respiratory tract or nasal accessory sinuses. This epidemic was apparently associated with influenza. Morse¹ considers most of the cases in the Boston epidemic as not acidosis at all, and that sufficient observations and examinations were not made to justify such a diagnosis in most of these cases.

One of our cases, which occurred in a boy 6 years of age, is interesting as regards the danger and possibility of acidosis due to the ingestion of a carbohydrate-free diet. The child was admitted to ward 12 with acute rheumatic fever, several joints being involved. He was put on child's soft diet, with milk, local applications to joints, and the usual antirheumatic treatment. After 10 days, although his fever was lower, the joint condition had not improved, and the stomach was being upset by the salicylates and bicarbonate of soda. The salicylates were then given by the bowel in doses of 60 grains once or twice a day in a 6-ounce solution, and his diet changed to a nominal carbohydrate-free one, cutting out potatoes, rice, and sugars, giving plenty of milk, fruit, vegetables, and a small quantity of bread. His improvement on this treatment was gradual until the end of the sixth week, when he was able to be up. In the seventh week he suddenly developed acidosis, manifested by one or two days' headache, malaise, and loss of appetite, hyperpnea, restlessness, and distressing nausea and vomiting supervened. His breath had the odor of acetone, often described as resembling that of chloroform. The estimation of acetone in milligrams per liter in the urine showed on four successive days, 1,125, 1,192, 1,140, and 38.5, respectively. An energetic alkaline treatment resulted in prompt relief in 48 hours, and, needless to say, he was immediately given a mixed diet, with sufficient carbohydrates. I think the etiology in this case can be easily explained; but in the class of cases, rare though they may be, in infants from 3 to 11 months of age it is impracticable to attempt an explanation. We have been unable to indict any one kind of milk. Cultures from the stools of the diarrhea cases have given negative results. The excretion of urine is usually diminished, and in severe cases borders on suppression. This is probably due in part to nonretention of sufficient liquids, and also to faulty excretion of the kidneys.

The early diagnosis of acidosis depends a great deal on keeping in mind the possibility of such a condition and the probability of

¹Quoted by Morse, J. L., *Boston Med. and Surg. Jour.*, April 20, 1916.

being called to see a case at any time. I consider that it should be easily recognized or suspected, and prompt means instituted to verify the diagnosis. The usual clinical signs at the bedside are restlessness, nausea, and vomiting, with dryness of lips, mouth, and throat. The child is listless, thirsty; there is a scant output of urine, with a strong odor of ammonia present. The acetone odor of the breath and the dyspnea or hyperpnea are characteristic. On physical examination there may or may not be fever during the first 24 hours, but later the temperature is variable, and may go high just before death. All cases that I have seen have had pronounced enlargement of the liver.

A determination of the carbon-dioxide coefficient of the expired air is probably the most reliable method of diagnosis in use, and an apparatus has recently been perfected by Howland and Marriott whereby this estimation can be had on children, but on infants it is difficult to get results. Ascertaining the ammonia content of the urine and its relation to the total nitrogen excretion is another method. The administration of alkalies and noting the resulting effect on the urine reaction, keeping in mind the amount necessary to change the reaction of the urine, is a useful test for verifying the diagnosis after the alkaline treatment has begun. Acetonuria of itself does not always mean that a morbid condition exists in the nature of acidosis, as it is said that acetone is found in varying amounts in more than half of all sick children, especially in the acute infectious diseases.

For all clinical purposes the combination of the following group of symptoms—viz., enlargement of the liver, hyperpnea, vomiting, thirst, dry mouth and lips, restlessness, acetone odor of breath, strong odor of ammonia in the urine, and heavy positive acetone ring with the sodium nitroprusside and caustic potash solution test—are sufficient evidence to warrant the immediate administration of alkalies.

Cyclic vomiting is mentioned in most textbooks as a condition due to acidosis. Such cases are now considered due to some pathological condition of the intestinal tract. Recurrent vomiting in cases that I have seen has been most frequently attributed to dietetic errors and not to acidosis, as most cases of this nature have been allowed by negligent mothers to indulge in excesses of sweets and starches. Two cases coming under my observation that gave history of repeated attacks of vomiting at intervals of six to eight weeks for two years were relieved by removal of diseased appendices. They have had no return of the vomiting attacks, and it is now more than a year since operation. Many cases are due to constipation or irregular feeding of the wrong quality and quantity of foods. Usually the variety is insufficient, and the child is allowed to partake of only a few articles of diet of which it is especially

fond. I might mention the possibility of the occurrence of post-operative acidosis, especially following chloroform anesthesia. Since the routine use of ether as an anesthetic has become established I doubt if acidosis occurs as frequently as it formerly did with chloroform. A fatal case of acidosis occurred in Ancon Hospital in a child 11 years of age, the symptoms beginning on the fifth day after operation for acute catarrhal appendicitis, ether anesthesia. The temperature was normal until just before death on the seventh day after operation, although the symptoms were present only 36 hours.

The prognosis in acidosis is considered grave in most cases, especially for infants and postoperative cases. An obstinate hyperacidity of the urine after 24 hours' treatment with alkalies, and a continuous high acetone element in the urine, accompanied by vomiting of all fluid taken by mouth, usually indicates in a given case that the disease is going to prove fatal. The earlier condition is suspected an treatment begun, the better the prognosis.

The treatment of acid intoxication consists in the administration of alkalies. While they do not remove the cause of the decreased alkalinity of the urine, yet, with our present knowledge of the pathology of the condition, it is all that we can do, and too often the symptoms are temporarily relieved, only to recur with a fatal result.

It is advised that alkaline treatment be given in all infant diarrheas. It cannot possibly do harm and may prevent the onset of acidosis as a complication. The routine administration to children of the alkaline fever mixtures, containing acitate and citrate of potash, as practiced by our preceptors, should be considered essential with our present knowledge of the occurrence of acidosis. For most cases a 4-percent solution of sodium bicarbonate with glucose or cereal water by mouth, or a 2-percent subcutaneous injection (being careful that the product is pure and contains no sodium carbonate, which, if present, is said to cause sloughing), or a 4-percent solution intravenously, are the proper and surest methods of administration of alkalies to older children. These percentage solutions can be given also by bowel, either in small amount to be retained or by the drop method.

In diarrhea the attempt to administer solutions by bowel is useless, for they will not be retained long enough to be absorbed. When vomiting is troublesome, as it is in most cases, small doses of 4- to 10-percent solution of sodium bicarbonate by mouth, one or two drams every 15 to 30 minutes, should be tried; or, equal parts of barley water and soda solution given. It is well to give a large draught of water two or three times a day that it may serve as a stomach lavage, and nourishment immediately following this procedure will often be retained. The vomiting in these cases is probably a central affair, and is often uncontrollable except by opium in the form of a paregoric or morphine hypodermically. When sleep and rest require it, I do not hesitate in its administration.

A solution of 5-percent sodium bicarbonate with 10 percent dextrose solution given freely by mouth and rectum is recommended as of value. The administration of alkalies can be gauged by frequent tests of acidity of the urine, and the treatment can be pushed until the urine is alkaline or neutral without untoward results. As soon as stomach retention will permit, carbohydrates should be given and plenty of alkaline water allowed.

The subcutaneous administration of 2-percent sodium bicarbonate solution is always painful, and should not be resorted to except, in cases of infants and children, when it is impossible to give intravenous injections, and nothing is being retained by the mouth or by bowel.

As acidosis, so far as the present pathological factors are known, is considered as a complication and not a separate disease entity, prophylactic measures are indicated, and such measures may often result in a recovery which would otherwise terminate fatally.

THE VENEREAL DISEASE CLINIC.***United States Public Health Service Work in Extracantonment Zone About Camp Zachary Taylor.**

By STUART GRAVES, M.D., Louisville, Ky.

The average physician, to say nothing of nearly all lay citizens, has a hazy idea that the United States Government is taking measures to protect the great new national army against disease, but he knows little or nothing of the reasons or the methods for carrying out this very important work. Students of history know that every great army has left in its wake a trail of syphilis which has blighted humanity for several succeeding generations. The world in other great wars has accepted this curse as one of the necessary evils of warfare. This war is different. It is the greatest cataclysm which has ever overwhelmed mankind. Every last ounce of physical energy, every last particle of natural resource, every last bit of mental and spiritual strength is being utilized with scientific finesse to produce the maximum effect. The man-power unit, physically and mentally fit, is the all-important factor in the struggle. The strain is so terrific and the principles involved are so deep-rooted that each side is taking measures never before considered, to conserve that unit.

A sick soldier is not only an ineffective offensive unit in himself, but also keeps a certain number of other soldiers from fighting; he uses supplies which might otherwise be utilized for sound men to kill Huns; and that is what we need to win this war—sound men to kill Huns.

It is a simple corollary that, if a sound soldier is the effective unit and a sick soldier keeps more than himself out of the fight, the more men the government can keep off the sick list, the more effective the fighting forces will be in an increasing proportion. This is being recognized as in no previous war. An old saying is that prostitution follows the army. Modern experiences would indicate that this old saying is neither wise nor necessarily true. The Japanese army went eighteen months without having an immoral woman in the army. It is well known that the Japanese army was exceedingly efficient. Space forbids statistics on the prevalence of venereal disease among the armies of the world. It is the most

*From the Pathological Laboratory of the Medical Department of the University of Louisville and of the Louisville City Hospital.

serious single danger existing. Anyone who doubts this should read the authoritative statements published by the Committee for Civilian Cooperation in Combating Venereal Diseases, Council of National Defense. The United States has the advantage of the other warring nations in being able to learn lessons from their experiences, and it is tackling the problem of the health of the army as vigorously as other problems. It is not only organizing the medical affairs of the army and navy as never before, utilizing in the Medical Reserve Corps also many thousands of the best physicians and surgeons of recent civil life, but it is reaching out through the United States Public Health Service into civil government, cooperating with and strengthening state, county, and city health departments with, always, one object in view, to keep the soldier in good physical condition. Incidentally it is directly and indirectly rendering great benefit to those communities in which it is working, especially those communities which harbor tens of thousands of virile soldiers gathered suddenly together under new conditions. This work must be known to be appreciated. To be appreciated it must be met by every citizen with the spirit of cooperation, not only because that cooperation is a patriotic duty, but also because it is self-preservation. Thiebierge says that every soldier contracting syphilis now may be considered as representing at least one less soldier and one less father of a family in the years 1936-45. Pautrier, on his estimated figure of two hundred thousand fresh luetics in the French army, says that this means at least four hundred thousand stillbirths in the years to come; and we might add that, even if the children did live, a vast proportion of them would be better dead than they would be in such a condition that they would have to be kept by the state.

Syphilis is as old as civilization, but only in the last few years has it been understood. It affects every tissue in the human body and makes itself manifest in a score of different loathsome forms. It is infectious and is spread only by contact, usually in illicit intercourse, although there are a surprisingly large number of innocent infections. The specific infectious organism is well known and easily recognized. Accurate methods of early diagnosis are perfected. Effective means of treatment are at hand. What, then, is the greatest obstacle to its prevention and cure? Ignorance—ignorance, greater or less in amount, on the part of all laymen and many doctors, together with a certain prejudice against the frank discussion and handling of the disease.

To fight syphilis and gonorrhea in the extracantonment zone about Camp Zachary Taylor, the United States Public Health Service has established a venereal disease clinic at the Louisville City Hospital and is carrying on an educational campaign throughout the zone. Louisville has a new million-dollar public hospital with a

large outpatient department. The work in it is carried on largely by the medical department of the University of Louisville. The new clinic has been made possible by cooperation between Surgeon L. D. Fricks, in charge of the extracantonment health work, Dr. Henry Enos Tuley, dean of the Medical School and superintendent of the hospital, the city board of health, the city board of safety, and the American Red Cross. The genitourinary, and skin and medical gynecological clinics of the outpatient department of the hospital have been made over into a government clinic. The city is furnishing quarters, equipment, operating room, and ward beds for salvarsan, and is placing at the disposal of the clinic its visiting staff, social service department, and nurses. The government has engaged full-time physicians for the clinic and male and female nurses for field work. It is also undertaking to furnish all the salvarsan needed. The serological work is done by the pathology department of the school and hospital. The underlying principle of the whole scheme is that "an ounce of prevention is worth a pound of cure." The prime object of the clinic is to make infectious cases of syphilis noninfectious. Although the clinic has not yet been in existence two months, it has more than doubled the average monthly record of 1917 and is growing rapidly. Any charity patient may attend morning, afternoon, or night. Twenty-four doses of American-made salvarsan were administered in the operating room of the hospital in one afternoon last week. Whereas previously there was no night clinic, as many as twenty-eight patients have been examined in one night. Three hundred night patients were treated in February. About the city, in lavatories of hotels, barber shops, railroad stations, and other public places, in black and red type and patterned after the long-familiar style of venereal disease advertisements, hundreds of the posters shown in the illustration have been placed.

At the post-office, the city health office, and elsewhere educational leaflets are distributed, such as Martin's "Social Hygiene and the War," Rucker's "The Sword of Damocles," and others published by the American Social Hygiene Association. The "tenderloin" has been closed, and street-walking is being repressed as much as possible.

Every week the different camp reports to the Surgeon-General show venereal disease to be more prevalent than almost all other diseases put together. Civilians and doctors outside the army must not forget that every soldier with syphilis or gonorrhea is a source of that disease for previously clean boys and girls near the camps. That reason, if no other, should impel every citizen to give his heartiest cooperation to the work of the government in the extracantonment zones. The soldiers must be kept in condition. The civilians must be protected. The unfortunate have been exploited long enough. Quacks who have blackmailed and beggared shamed

POSTED BY ORDER OF THE
HEALTH DEPARTMENT

Venereal Diseases

GONORRHEA (or Clap) is a Germ Disease. It Causes—

1. Ill health and loss of time and money to the man infected.
2. Many innocent wives to become invalids for life.
3. A large proportion of surgical operations upon women.
4. Many childless marriages.
5. Much of the blindness of children.

Gonorrhea can be cured, BUT OFTEN IS NOT CURED when the man thinks himself cured.

The germs of gonorrhea often remain hidden in the body ready to cause serious trouble even when the symptoms of disease have apparently ceased under treatment. When not properly treated the disease may remain contagious for a long time, even though the man feels well.

SYPHILIS (or Pox) is also a Germ Disease

which, if not cured, may be transmitted to wives and children many years after infection, and is likely to cause insanity, locomotor ataxia or total paralysis.

Syphilis can be cured, but only by thorough medical treatment.

PREVENTION

Gonorrhea and Syphilis can be prevented if men will

1. Keep away from prostitutes, both professional and non-professional.
2. Realize that sexual intercourse is not necessary to physical and mental health and practice continence.
3. Learn that antiseptic washes and other preventive measures are not reliable.

BEWARE OF ADVERTISING SPECIALISTS

who claim to cure "nervous debility," "lost manhood," "enlarged veins," "blood poison" and "private diseases of men."

Night Emissions, or Wet Dreams, if not too frequent, are natural in men. They are not a sign of "lost manhood." These advertising specialists get large sums of money for treating "diseases" which do not exist.

Patent Sex Medicines Are Useless; their purchase is a waste of money, and their use may lead to very serious consequences.

THE THING TO DO

If you think you have gonorrhea or syphilis, or have exposed yourself, go at once to a competent physician.

YOUR HEALTH OFFICER WILL GIVE YOU HONEST ADVICE free, and aid you to obtain scientific treatment if you consult or write to him.

YOU CAN HELP OTHERS by telling them the truth about these diseases and setting them an example in self-control and self-respect by standing for the same standard of sexual conduct for men that you expect women to maintain.

Free circulars of information may be obtained through the health office or

AT ROOM 515 POSTOFFICE BUILDING.

FREE GOVERNMENT CLINIC at Louisville City Hospital for those unable to pay. Hours—9 to 10 A. M., 2 to 3 P. M. and 7:30 to 8:30 at night.

Publication No. 62

Placard posted by the Louisville Health Department in lavatories of hotels, barber shops, railroad stations, and other public places.

patients must be driven from practice. Suggestive advertisements must be suppressed. A propaganda of education should be quietly and unobtrusively, but thoroughly carried on. The venereal disease clinic is doing a great work. It deserves to be better known by the public and it, as well as the other activities of the government in the extracantonment zones, merits our hearty support for our country and our homes.

AGRICULTURAL WORK—THE RATIONAL TREATMENT FOR MENTAL DISEASE.

By JOHN I. W. ROWE, M.D.,

First Assistant Physician, Manhattan State Hospital, Ward's Island,
New York City.

The New York state hospitals boast of the possession of 8,000 acres of land, and the Government is appealing for increased food production. The question arises, What quantity and value of products do they furnish? There are 37,000 patients in these hospitals—an army of farm soldiers; are they doing their share to lessen the cost of farm products? The fundamentals are fertilizers and labor. We have the labor, and the manure we can obtain. This large acreage is distributed among 13 hospitals, ranging from 1,200 acres down to 25 acres; some are veritable estates in size, capable of producing splendid root crops of great value and variety. It has been said that he who makes two blades of grass grow where one formerly grew is worth more to the nation than any lawmaker. What of him who produces two potatoes instead of one? He certainly is entitled to our grateful acclaim. Hundreds of acres of this land produce only the minimum crop, many are partial failures, and others are unsuitable for storage or distribution to hospitals less productive. France, Canada, and our own West are calling for more farm help. Vacant lots are being planted, and a visitor recently informed the writer that he had established 300 backyard gardens in a western city. Lawns are being sacrificed to the plow, colleges and schools have discovered farming and made it fashionable, and are vying with one another in cultivating crops. Exhausted and unbroken lands should be tilled.

Only last winter, potatoes, turnips, and onions were selling at the price of imported Dutch bulbs. The inexperienced and amateurs, the strong and the frail, are bidding for the opportunity to till the soil. An enormous quantity can be grown on these farms, but efficiency and intensive farming are needed. The crops should be doubled, but only those of value and keeping qualities should be grown. One should not look a gift horse in the mouth, but a shipment of apples received in the past were small, misshapen, and dry, suggestive of trees in need of free pruning or grafting into juicy apples of permanent qualities. Summer crops have only transient value—are a mere change from the dry foods of a long winter, and have considerable waste. Potatoes, turnips, parsnips, and onions assure a fairly certain crop of large market value and easy cultivation. With our past year's experience of roots at prices

within the reach of only profiteers and mine owners, we should cultivate intensively and turn every rod of land to account. Headlands, exhausted pastures, and hayfields should be cropped with roots; old grass lands rich in vegetable fiber will return a valuable crop of feeding potatoes or turnips with but little, if any, fertilization. Prairie lands and century-old pastures give excellent crops for one or two years without manure. Tearing up flower beds and lawns and overlooking the odd corners is but saving at the spigot and losing at the bung. In the frenzy of our newly aroused spirit of efficiency, pansy beds and ornamental parterres were abolished to make way for beets and carrots. In our zeal the jewel of consistency may be lost sight of.

We must double our efforts, plant more and produce more at lower cost, and that is efficiency in its highest meaning; not that of the "fancy" farmer who offered his guest milk or champagne—"they cost the same." This horrible war, with its loss of life and suffering, has compelled us to exert ourselves as never before merely to exist, much less enjoy luxury; but good may ultimately come out of it all. Reforms are needed; foodstuffs must be produced in such quantity as to preclude the return of the scarcity and ruinous prices we have suffered. Farming must be more intelligent and intensive; lands big and little must be cultivated; two bushels should be obtained in place of one; farm yield in Europe is three times larger than ours, and more vegetables and plainer cereals are eaten over there. We must be more efficient, work harder, idle less. We must rouse ourselves to activity and hard work. Shall we, after the danger is past, remain awake or think we deserve a rest and go to sleep again? Are we in earnest, is each of us doing his best, or are we getting through the day with the least possible trouble and heaving a sigh of relief when evening comes and we cease working? Very few of us are applying every ounce of energy and resource we possess in our daily tasks. Most of us could without any great effort do twice as much if the incentive were there; but man, being a lazy animal, will put his back into his work only when spurred on by ambition or hunger. We should see that everyone strives to do his best, secures increased output and greater efficiency all around. There is technic displayed in the simplest of agricultural work. Agriculture needs science to show farmers what can be done to secure better results by the increased use of proper fertilizers and sowing of disease-resisting crops. Success is measured by output in quantity and quality. Every craft can be made more efficient if we go about it in the right way. Good relations between master and man, proper lighting and ventilation of workshops, give increased output and profit. An efficiency campaign must be started; efficiency should be the watchword. The pass to which we have come, due to shortage of labor, high prices of most things,

and absolute lack of others, must never come again. Let us hold no illusions about the coming shortage next winter. More men are in war industries and work connected with the war. Fewer producers are left, and before snow flies again we shall be reaching out eagerly for food stuffs and the wherewithal to pay for them. The control of our railroads, our foods and fuel, even our daylight, has been taken from us. We bow amiably to these reforms which make for efficiency, but we require to be startled out of our lethargy. When peace comes, efficiency will be more than ever necessary, and it is the duty of everyone to do what he can to make himself as efficient as possible and prevent such awakenings as we have had. The labor question, the despair of the farmer today, can be viewed with equanimity by state hospital farmers. Its very scarcity opens up a perspective of delightful employment for our thousands of patients. Those splendid farms should be tilled for profit and to relieve shortage; but, more important still, their cultivation would be a curative measure for our patients of the very highest value. As a builder-up of the mind, body, and character, its value would be beyond computation. It is a discouraging sight—that of hundreds of patients lolling aimlessly about, too apathetic to ask for active work, settling down to the drudgery of diningroom work or carrying messages and sweeping halls. They don't improve, their acquired lazy habits unfit them for work on the outside, and in despair their people return them to the hospital, with the report that they cannot hold a job—are surly and defiant, and think of nothing else than cigarettes and bad company. Women and educated men are embracing farm work with pleasure, so irresistible is the "call of the land." "The man with the hoe," immortalized by Millet, is a poet and an artist, as he loosens and places the nourishing soil around the tender nurslings of Mother Earth. Agriculture is the oldest of the crafts. Here are the picturesque rolling farms, the ever-changing variety and healthful surroundings leading to improvement and recovery not found in any other field of labor. Healthy farm work, with the charms of rural life and the scent of the hayfield, have no allurements for the city rough-necks and thirsty gentlemen of the road—they abhor it. It has too much of the ideal. Big, husky men, built like longshoremen, look for only easy jobs, like messenger's duties, dusting chairs, and carrying trifles from room to room. Work they evade. The farm, road-making, and the coal heaps should be for them. The slackers, the incorrigibly lazy, and paranoiacs should have close observation and domestic work, but it is the occupation par excellence for the large number of patients that have intelligence and a dormant taste for refinement—for college and professional men, artists and students and clerks, educated business men, and many others of liberal education and instincts not deadened or perverted. Women of intelli-

gence have a keen taste for the charms of Nature, and make just as good farmers and florists. A superintendent once declared that farm work was not suitable occupation for refined women. There can be no greater mistake! Woman is entirely at home with her vegetable garden and flower beds, and they are invariably more successful in crops and variety than are men. Horse show equestriennes and tennis champions will appreciate this solicitude for them. Whether women can do the work efficiently and without danger to their health has been the subject of the deepest concern. Clergymen of blessed memory were noted for their rose gardens and asparagus, and the daughters of Eve have ever gloried in delightful herb patches. Our grandmothers' kitchen gardens lacked nothing; they were wont to grow great stores of anise, caraway, and coriander, suggestive of Bible days; they loved garden work amid the thyme and columbine, so oriental and spicy in their names. They always attract women of artistic taste. The college man will make the better farmer, as he will the best horseshoer and shoemaker, than the mere tradesman. A college-bred plowman of my acquaintance was noted for his skill with the plow, and turned a furrow as straight as an arrow, and in fencing he was an artist among artisans. The gold-beater in Cellini was a beautiful and artistic workman; others were only tradesmen. The plain stone-cutter of Hugh Miller put soul into his work, and it became art. The gentlemen rider takes the stiffest jump. Farming is work for the educated. Many of our patients, from inexperience, hold themselves back; but, once encouraged to assert themselves, make the best workers. Their inborn intelligence enables them to recognize the benefits derived from healthful work and elevating surroundings. It is not only our duty, but should be the chief object of treatment to return them to their family in the best possible condition. Work, regular meals and sleep, under medical observation, are ideal living conditions unknown outside of state hospitals. They should be sent home not only well, but fortified to remain well. Treatment too often ends with their departure, followed by an early relapse; but, as the hospital life gives them a healthier look than they ever had in their lives, their friends importune for their too early release. Permanent recovery, not mere restoration, is what we should strive for to enable them to withstand the wear and tear and dissipations awaiting them outside. They should seek this hospital as they would a fashionable sanatorium, obtain a new bill of health, and, with "men's sano in corpore sano," turn their backs on the hospital forever.

By the sweat of the face will come health and happiness. From the monotonous industries of most hospitals, what a delightful vista opens out for the intelligent patient of well-ordered fields, shaded lanes and great trees, land covered with the wealth of golden

pumpkins, the prodigal field of Nature's richest gift—the humble potato, universal food of the world—and the green and golden apples, rich with the thirstquenching “salurian nectar” of the gods. Work in such a vineyard would be a labor of love. The patient's artistic side would rise in response to such charming environment, and his improvement would be prompt; his skill would develop amazingly. In the hay field he would find that turning hay is an art; few townsmen can turn it correctly. Harrowing he would discover to be an art—not labor. Picking fruit from the trees would call for his most delicate touch. His skill in these will stamp him the master craftsman. The swinger of the scythe, he will find, is not only a workman, but an artist, brain and muscle working together in perfect harmony as he draws the stone along the glittering blade with a finishing silky touch that shows the craftsman indeed; and the plowman, the supreme creative artist, with that simple implement centuries old, who holds in the hollow of his hand the destiny of nations; and, to fill his cup of joy, the seed-sower, with harmony of eye and brain, and noble sweep of arm, in which lies the hope of the country. Though the brown loaf and bed of boughs of Socrates may not be his, the health-giving war food and wine of the earth, sparkling with the spirit of Croton, will furnish the health and vigor, strangers to him in his life amid bricks and mortar. From this Arcady he will bear away with him the memory of Nature's storehouse, the fragrance of the flowers of the fields, the atmosphere laden with the scent of hawthorn and lilacs, and the happiness that goes with restored health.

EXPERIENCES AT THE MAYO CLINIC AT ROCHESTER, MINN.

By JOHN A. HORNSBY, M.D., Chicago.

"Pay clinic," group diagnosis, and team-work, both in and outside the hospital, are tremendously important problems at the present moment. One of the greatest clinics in the world and one of the most important centers for group study and group diagnosis is the Mayo Clinic of Rochester, Minn.

In September last the War Department at Washington intimated that I would probably be called on in the very near future for some pretty strenuous work in connection with the war. Just at the moment I heard this I was trying to think of some way by which I could secure some information for the readers of this magazine which would throw some light on these problems of group diagnosis, etc. The situation seemed made to order, and I conceived the possibility of having myself looked over most critically in order to determine my fitness for military service, at the same time the opportunity to study the Mayo Clinic to see if there was anything being done there that the medical profession and the hospitals in the country ought to know about that they did not know at this time. I therefore applied to Dr. Charles H. Mayo for permission to enter the Mayo Clinic as a patient, and I told him of my need to know exactly my physical condition. I did not tell him then or at any time up to the moment this is written that I had any other idea in mind except my own physical condition.

I have not consulted Dr. Mayo about my writing this article, and Dr. Mayo will learn for the first time when he sees this article, if he sees it at all, that I intended to write anything about my experiences in Rochester.

I arrived in Rochester one Saturday evening in September. On Sunday I was visited at my hotel by "Dr. Charlie," as the people of Rochester affectionately call him, and was given very brief instruction preparatory to my entering the clinic for examination on Monday. There were more than two hundred new patients in the city and at the clinic on Monday. A very cursory examination was made merely preparatory to what I was to be subjected to later on. The net result of this examination was the order that I had on late Monday afternoon. I was told at that time to eat a very light supper, and at 9 o'clock I was to eat fifteen raisins, with specifications as to their quality, and I was to eat nothing else until

7 o'clock Tuesday morning, when I was to appear for stomach examination.

On Tuesday morning at 7 o'clock I appeared at the clinic, with many misgivings, perhaps because of a general impression on my part that my stomach was to be emptied and the contents analyzed, and even then I was beginning to suspect that there was not much in my stomach, even the raisins. There were forty of us "stomach patients," and each of us had dished out to him or her six crackers and 6 ounces of sterile water—which I at least ate with a good deal of relish. Some of my fellow patients were not so fortunate, my elbow neighbor telling me that he had been starving to death for ten months and that he would give a thousand dollars to eat one of the crackers which I was disposing of with such evident relish.

After we forty had had our "breakfast" we were all seated in a row along a corridor and just forty-five minutes later the disinterment began; I was first, probably because I had finished my breakfast first, and was escorted to the first seat in the row. From this time on each of us was handled singly. I was led to a small disrobing room, where I was required to remove everything from my waist up and was given a sort of Chinese jacket, the washableness and brevity of which I suspected had some connection with what was about to happen to me.

I was then ushered into a small examining room, which contained a number of basins and a great array of immaculately clean but suggestive tubes. The rest of the equipment of the room was two young women also evidently "trimmed" for battle. I had expected that if a stomach tube was to be used, it would probably be handled by a physician, and I must say that I had serious misgivings about the efficiency of the young ladies.

I sat in the examining chair, took a long breath, and made my peace more or less with my Maker, and figuratively put myself in the hands of the two young women.

"Open your mouth," I heard a voice say.

"Swallow," came from somewhere.

I had seen the huge tube coming toward me, but now it was gone—where, I could only suspect because really I had not felt it. I went on breathing and nothing was happening except that outwardly I could see that my breakfast was coming back into a glass. But, of course, I had not yet begun to have my stomach pumped, and, while I was waiting for the worst, one of the terrible ogresses, she who had pointed the weapon at me first, said sweetly, "That's all now; you may go and dress."

I was in the room exactly one and a half minutes.

Some of my unfortunate shipmates of the trip did not go over quite so easily; for instance, the poor fellow who would have given a thousand dollars for one of my biscuits—if he could eat it. It

transpired that even a horsehair bougie would not have gone into his stomach.

One patient, it turned out, had had a gastroenterostomy done some months before and was back merely to be "observed." His "breakfast" had not even stopped in his stomach, but had obeyed the law of seeking its lowest level, and could not be recovered. That was one good breakfast wasted.

My next class was with Dr. Carman in the fluoroscopic room. Again my clothes went off from the waist up, and again the Chinese jacket came into play.

There was nothing parsimonious about the Mayo Clinic. They give you plenty to eat—and sometimes they let you keep it; as, for instance, Dr. Carman's assistant set me down to a delicious dish of oatmeal. I suspected the oat was merely a camouflage, and there might be barium salts or bismuth concealed about its person. At any rate, I had become extremely hungry after the young lady and her stomach tube had done their worst, and I was prepared to dispute the possession of the oatmeal breakfast with all comers. But Dr. Carman is a good feeder himself and evidently enjoyed a good breakfast, and even enjoyed the sight of one, because he stood me up between two frames and looked at my breakfast through the fluoroscope. He looked at it a long time, turned me this way and that and the other—every way except upside down. I would not have stood for that. Evidently the use to which I was putting that breakfast pleased him, and he must have assured himself that it was not being wasted, even in this day of conservation, because he gave me a big white mug of what might have been milk to drink, and told me to drink it all, but to drink it slowly—and he watched it go down. I was almost sure that he was going to take it away from me because it was really good and was filling a long-felt want, but instead of taking it away from me he gave me another just like it, which was satisfying even to the point of repletion. Then someone handed me, although it was totally dark in the room, another mug full of something. Dr. Carman called it "brown mug." I was to drink all of that too, slowly. I wondered for how long I was to indulge Dr. Carman in his enjoyment of my scenery, and then I began to wonder too whether he was determining how much I could hold without bursting. After the fourth mug I lost my count, but I didn't lose any of the contents of the mugs, which seemed to surprise Dr. Carman, because he then sent me into another room to have some pictures taken evidently for the purpose of determining if there was any leakage in my plumbing. Evidently everything held; at least Dr. Carman told me he had found nothing and told me to come back the next morning. I suspected he was going to try gas under pressure or maybe attach me to the street fire plug, but he didn't.

In a corridor of a clinic on the afternoon of my third day I ran across "Dr. Will" Mayo, who was surprised that I was sick. I explained to him that I was getting better rapidly, and thought I would soon be a well man if I could have more of Dr. Carman and less of the young ladies in the pump room. I told Dr. Will that I had skipped a couple of the classes on my travels through his institution. But that was not to be. It seems that after you get started in the Mayo Clinic it is like going through a maze at the circus; there is a lot of it that you do not understand and cannot see, but you have to take it all before you come out at the other end where the fat lady and the tattooed man are.

Seriously, Dr. Will insisted that if I was to be examined, I was not to be half examined, and that when I left Rochester they were going to know whether I possessed a soul or not, and they would be able to give me all the physical characteristics of what mind I had.

I went through the other classes, including complete blood examination, and a series of tests by the assistants of Dr. Wilson in the pathological department. Then I passed along to the specialists, those who look over thyroids, parathyroids, and those who look after the ductless glands. In all I had the services of exactly seventeen different specialists.

By Friday afternoon there had accumulated about me enough data to fill a good-size quarto volume—and then I was told as a summary of the findings that all that ailed me was a superfluity of carbohydrates stored in my tissues, and the treatment prescribed, which I was strongly advised to adhere to strictly, was, "Go home and get to work."

I went home without having said one word to anybody in Rochester about my ulterior motive.

I have attempted in my artless and clumsy way to tell the story of my visit to both the Mayos, with a slice of attempted humor here and there. With me the visit was a most pleasant one. I saw a lot of fine surgery in between "meals" and "classes." I saw many of my friends in the medical profession who had come from the various parts of the country to "brush up," and I enjoyed it all hugely.

But never for a moment did I forget the other side. There were those there who had been passed from family practitioner to specialist, from one specialist to another, each one doing a certain amount of entirely detached and independent work along the lines of diagnosis, and each one with a dozen or more incomplete or unwritten histories of the great tragedy of illness. My poor friend of the pump room who envied me my breakfast had his turn with Dr. Carman, and I saw him later taking his train for home to prepare himself as best he could for the inevitable results of a car-

cinoma of the esophagus. But he went away knowing what he had—which he had not known before.

Dr. Carman showed me through the fluoroscope a man who had a hernia, with protrusion of a considerable part of the stomach through the diaphragm and up into the pleura with its contents.

I do not consider that either of the Mayos or any of their assistants are miracle workers; no one claims that they are, but I do find something in the Mayo Clinic that I think I can say safely, after visits to nearly every other clinic in this country and some abroad, that the facilities for diagnosis and the cooperation between the specialists there give a better chance for correct diagnosis than at any other place on the earth that I know about.

I have known for years that it was the policy of the Mayo Clinic to keep a keen lookout all over the scientific world for specialists, and, wherever one poked his or her head up above the mass of workers, to get that one and make him or her a part of the "team."

Some day perhaps I shall publish a complete history of my own case in the clinic.

If this story is to be read merely through curiosity, and forgotten, or if my alleged humor is to be criticized, or, even let us secretly hope, enjoyed, then I have wasted my time and have wasted your time and have wasted space.

If, on the other hand, this story has contained a hint here and there of what a real clinic can and should be, and if I have possibly stimulated a spirit of emulation among the profession or among the hospitals, I shall be greatly satisfied.

I beg to apologize for the story to "Dr. Will" and "Dr. Charlie" and their associates. I have not meant to subject them to offensive publicity; I have meant only to present in my very poor way something that is being done, something that I think ought to be done everywhere, and I am sure they will appreciate the genuineness of my intentions and will not mind having been used as a vehicle by which I hope that the sick of this country and eventually the sick of every country will profit.

CURRENT NOTES

Macewen's Sign.

Macewen, of Edinburgh (Pyogenic Infective Diseases of the Brain and Spinal Cord, Glasgow, 1893, page 146), described his sign as follows: the percussion note is produced by the vibration of the cranial walls when struck, and is modified by the consistency and the volume of the contents, and their relative position to the bone. When struck, a thin skull vibrates more readily than a thick one. Indeed, a skull may be so thick that it vibrates little, if at all, to ordinary percussion. The note obtained in healthy adults is high pitched, imparting the idea of solidity. In many adults, in fact, the bones of the cranium are too thick and dense to permit active vibrations. In the cranium of the normal infant, whose bones are united only by membranes, the sound obtained is so dull and flat as scarcely to be perceptible. Should the contents of such a skull be increased sufficiently to produce tension, the note becomes clear. In healthy children in whom the ordinary density, consistency, and relation of healthy brain to cranial bones exist, a dull note is produced on concussion; but where the contents are more fluid, the bones will vibrate more readily, and a clearer percussion note will be obtained. A somewhat clear note is encountered sometimes in children who have the typical enlarged head associated with infantile rickets, but the change in note is not constant, and some of these rachitic children with a positive sign have been afterward proved to have ventricles filled with fluid. When the lateral ventricles are distended with fluid, the percussion note is markedly altered, the resonance being greatly increased. The exact musical quality of the note is difficult to describe, but it conveys the idea of hollowness. Macewen further states that he observed to a conclusion 10 cases with a positive during life, in whom frozen transverse sections of the brain were made postmortem, all showing distended ventricles, with thinning of the brain substance. He considered the upright position most suitable for eliciting the sign, and for percussion employed either the tip of the middle finger or the ordinary instruments used in percussing the chest. He believes the pterion, or a little posterior to that point, to be the best place to elicit the sign. He also makes mention of the fact that the ear of the investigator may be placed on contact with the skull of the patient, and the note determined in this manner. Special emphasis is laid on the change in the percussion note at one particular point, according to the position of the patient's head. In most cases the eliciting of the percussion note did not seem to incommode the patients, and in many instances the children were amused. The sign was present in 40 children and young adolescents, having distended ventricles arising from many different causes.

Wilcox noted the presence of a positive Macewen sign in children with serious meningitis, complicating gastrointestinal disturbances, pneumonia, typhoid fever, and influenza; also in various acute infections of the meninges, especially tuberculous meningitis and poliomyelitis. He found it absent in congenital hydrocephalus. He noted the reduction in the intensity of the sign which may follow lumbar puncture with the removal of varying quantities of spinal fluid, and he considered the sign of value in estimating the necessity for repeated rachiocentesis.

The latest contribution on this subject is given by Regan, especially as regards its value in poliomyelitis (*American Journal of Diseases of Children*,

July, 1918). His experience is based on an observation of 1,798 cases during the 1916 epidemic. He was distinctly impressed with the importance of this sign, as it has possibly the greatest value, according to Regan, in poliomyelitis, with the exception of tuberculosis meningitis. In order to understand just why the sign is so striking in poliomyelitis, we must recall the pathology of this disease. In the edema of poliomyelitis the lateral ventricles are often definitely enlarged postmortem. During the early, acute stage of the malady this enlargement is due to distention as a result of the increased formation, diminished secretion, and resultant accumulation of cerebrospinal fluid. The soft, yielding tissue of the cerebral hemisphere is thus compressed between the unyielding calvarium and the distended ventricles. This gives an entirely different relation to the tissues within the cranial cavity, passing from within outward, as compared with that which exists under normal conditions. With the distention of the ventricles and the edematous swelling of the brain tissue that occurs with the onset of poliomyelitis, the subarachnoid space is partially or more usually obliterated, the spinal fluid being displaced into the larger cisternas, the membranes are crowded together, the brain is brought into more or less immediate contact with its bony covering, and the tension of the contents of the cranial cavity is raised. We know that when the lungs are compressed, the sound heard over them shows increased resonance. So it is with the skull—the greater the tension of the cranial contents, the more resonant is the quality imparted to the note. Normally the sound heard over the frontal and parietal regions is flat, like that heard over a thick and not too resonant board. The quality of the sound conveys the idea of hollowness. It is best imitated by loosely clasping the fingers with the palmar surfaces opposite, but not touching, and then quickly bringing the latter together with moderate force. Some of its qualities are also manifest when forcible percussion is made over a pulmonary cavity with the mouth open. In recognizing the positive sign, two elements must be considered—the auditory and the tactile. The auditory element has just been described. The tactile element is also important, for there is much change produced and conveyed to the percussing finger. Normally, on percussing the skull, the finger receives the impression of a hard, bony, resistant, and unyielding surface, the retention of the vibrations by the bony envelope of the skull being definitely appreciated. With the ventricles filled with fluid, the impression conveyed is distinctly different, in that the vibrations set up are felt to be transmissible to the contained tissues, and the percussed surface feels less resistant and unyielding than previously. This sign is more appreciable in infants than in adults or adolescents; in fact, it is often not seen in the latter due to the thickness of the calvarium. It is, therefore, a much more valuable sign in children than in adults. Regan uses the sign, but keeps the poliomyelitic patient recumbent. It is elicited as follows: the pillow is removed, the head is turned to one side, and percussion carried out over the region of the parietal eminence which is lowermost, after which the position of the head is reversed and a similar area on the opposite side is percussed. Preferably remove the infant from the bed, and carry out the test on a flat table. The room must be quiet, and the examiner must bring his ear close to the skull of the patient. Gentle tapping with the tip of the middle finger is just as effective in bringing out the sign as hard, loud blow with the finger or percussion hammer.

A few factors may hinder the development of the sign. In colored patients the skull is thickened by rickets. A large growth of hair interferes, but this may be remedied by clipping or shaving the hair.

In Regan's opinion the degree of the positive sign is usually proportionate to the pressure and quantity of spinal fluid removed on lumbar puncture. Wilcox noted a change in the percussion note after the withdrawal of spinal

fluid. It is true that small quantities make no difference, but, when more than 20 or 30 c.c. are withdrawn, a different note is obtained. A Macewen may coexist with a bulging anterior fontanel because a moderate degree of ventricular distention may produce a tense and bulging opening, while a greater degree will alter the relation between the cranial bone and its contents, crowding the latter closely against the former, and increasing the bone conduction so that a new note is produced on percussion. It is not uncommon to see distinct evidence of pain on percussion of the skull. Regan showed that when a child was sleeping, on percussion he would awaken and begin to cry; or in a stuporous case, the percussion would often arouse a patient to such an extent as to show evident disapproval of its further use. Children older than this would state that the bone hurt and would ask to be left alone.

Metainfective Fevers.

Under this heading Professor Umberto Baccarani, in *La Riforma Medica* of March 16, calls attention to the fact that patients, subsequently to acute febrile diseases, not infrequently develop after a few days of complete apyrexia a subfebrile condition which is not easy to account for. These processes are of variable duration and uncertain course; their pathology is different in different cases and often puzzling to explain. It is necessary, in the first place, to exclude from this category relapses and reinfections of the primary processes, and complications attended by febrile manifestations of evident origin and easy interpretation. True metainfective fevers may be the only manifest expression of a slight and temporary complication of the previous acute disease, or may have their origin in the flaring up of some morbid condition not previously recognized, or depend on some unusual complication which has no relation to the preceding infection. But in other cases the metainfective fever is cryptogenetic or essential in the sense that its real cause remains obscure in spite of the most diligent investigation and laboratory research. When, therefore, a patient in an apparently well-established state of convalescence has a rise of temperature from causes which otherwise are not capable of raising it, the implication is that we have some potential morbid condition which should be thoroughly investigated. Such metainfective fevers usually make their appearance a few days after the cessation of the illness—from three days to a week. After this period the occurrence of fever cannot be classified under this appellation, since it almost invariably points to a true and recognized complication of easy diagnosis and special characteristics. Their duration is short, not usually more than a week, their form and course strikingly variable, and their intensity moderate, the temperature ranging from 37° to 38° C. Professor Baccarani's clinical observations have led him to attribute the cause of these metainfective fevers to the following conditions:

1. A simple follicular colitis, usually concomitant with a return to more substantial diet and associated with slight abdominal pain and distension, loose stools, or constipation. The condition disappears rapidly on a return to milk diet.
2. A mild appendicitis, with absence of any prominent symptoms at the time, but which becomes evident by subsequent events.
3. Cholecystitis, most often after a typhoid infection.
4. Pyelitis and cystitis, revealed by examination of the urinary sediment, and especially frequent after typhoid and paratyphoid infections.
5. Endocarditis of a benign type.
6. Slight localized pleurisies.
7. Osteomyelitis of mild type, the only symptom being an aching and tenderness in the lower third of the thigh; this cause is most frequently met with in young adults and children.
8. Cryptobacillary fever—tubercular, malarial, or syphilitic.
9. Adenoids.
10. Diseases of the female genital system.

11. Slight inflammatory conditions of the skin or subcutaneous tissue caused by hypodermic injections of camphorated oil.

Professor Baccarani's observations are singularly interesting and suggestive. The interaction of morbid processes is a subject which has as yet not attracted the attention it merits. The occurrence of febrile or subfebrile conditions during convalescence is very frequently observed, and is too often disregarded or looked on as a mere incident in convalescence. We hope that Professor Baccarani's paper will lead to a more scientific analysis of these conditions in this country. It is more than probable that research on these lines might lead to some valuable results both in pathology and treatment.—*The Lancet*, July 6, 1918.

Diagnosis of Acute Staphylococcic Infection.

I will conclude this letter by giving a few details on the diagnosis of acute staphylococcic infection, a process which is uncommon, but during a year instances have occurred in the French army, and, as the affection is not generally known, what is to follow may not be devoid of practical interest. All things considered, the symptomatology of staphylococcemia enters into the symptomatic picture of bacteriemias in general. It is the early diagnosis of this generalized septicemia, without any marked predominance in any particular viscus, that gives rise to very great diagnostic difficulties.

All these patients offer a typhoid aspect, and, with the headache, high temperature, general malaise, and abdominal meteorism, one is quite likely to suspect typhoid rather than a general infection. However, the analysis of the various symptoms will allow one to differentiate between the two processes. In staphylococcic septicemia there is one big chill, the temperature chart offers an irregular curve with marked oscillations, the affection undergoes its evolution quickly, while the patient's general condition rapidly becomes serious. The pulse soon reaches 180 to the minute and the temperature ranges between 103° and 104° F. In typhoid the initial chill is lacking, the temperature is quite characteristic, and the pulse corresponds with the temperature. The appearance of rose spots will remove all doubt. In epidemic cerebrospinal meningitis the headache, vomiting, and constipation may simulate those encountered in acute staphylococcic septicemia, but in the latter there is no strabismus nor unequal pupils, photophobia, or convulsions. When some viscus is particularly involved in staphylococcic septicemia, the diagnosis becomes somewhat easier. In this case the general symptoms, the infectious character of the visceral lesions, will be the means of attributing them to their just cause.

In cases of secondary staphylococcic septicemia the process may be overlooked, because during the evolution of a disease, or during convalescence from some affection, the secondary septicemia will be regarded as a recrudescence or relapse of the original disease. There is, however, an excellent diagnostic sign that may not be generally known to your readers—namely, that when a secondary staphylococcic septicemia is about to declare itself during some infectious disease, the temperature first falls to the normal, or even below, and this sudden defervescence is far from being a good sign, because within a few hours it is followed by a rapid rise of temperature, which is also accompanied with profuse sweating and a tendency to collapse.

A septicemia—be it primary, consecutive, or secondary—having been diagnosed, it remains to discover what bacterium is at the bottom of the process. Since the clinical signs are not characteristic in any of the various septicemias, a diagnosis cannot be made with any degree of certainty, so that recourse must be had to bacteriology.

The only proper way to carry out this examination is to aspirate about ten

c.c. of blood from a superficial vein of the arm with a suitable syringe and needle, and directly inoculate gelose, gelatine, and potato, which will give rise to the development of characteristic growths of staphylococci in 24 to 36 hours if this organism be the etiological factor of the process.—Cumston (of Geneva, Switzerland), in *New York Medical Journal*, July 27, 1918.

Ventilation and Carbon Dioxide.

G. O. Higley, in a paper on The Safe Limit of Carbon Dioxide in the Working Atmosphere, states that the conclusions of investigators seem to be about as follows: In the opinion of Flügge one may breathe for several hours air containing twenty times the usual permissible percentage of carbon dioxide without perceptible deleterious influence upon his health.

The more rigorous methods of the New York State Commission for Ventilation reveal the fact that stagnant air containing two to fifteen times the generally accepted amount of carbon dioxide may be respired seven hours per day for five or more weeks with no perceptible effect upon heart rate, on increase of heart rate on standing, on blood pressure, Crampton value, or respiration of the subject.

On the other hand, all the deleterious effects that were formerly attributed to respiring carbon dioxide present in stagnant air may be produced by breathing, for the same period, air that is practically free from carbon dioxide, but which has a temperature of, say, 90° Fahrenheit and a very high relative humidity.

Also, that a cold, dry air when heated to 80° or more without humidification may produce, when respired for some time, the deleterious results so beautifully demonstrated by Cocks.

The matter is well summed up by Professor Lee when he says that "the problem of ventilation is physical rather than chemical, cutaneous rather than respiratory."

In view, then, of the fact that recent investigations have apparently shown carbon dioxide to be harmless when respired in much larger amounts than .08 percent, it is suggested that the safe limit of this gas in the working atmosphere be placed at .2 percent.—*American Journal of Public Health*, July, 1918.

Assuming Vices.

Though tremendously extolling the virile energy and perseverance which woman has brought to bear on the masculine work she is doing, there are those, particularly French doctors, who express anxiety because she is sometimes assuming the minor masculine vices, such as excessive cigarette smoking, drinking, swearing, and an irreverence for chastity. Such women pay men a high compliment in imitation, but the price is heavy. It would not matter so much if they had started out into the world of men with no special vices of their own, but to add the masculine weaknesses to their own emotional shortcomings, their cunning, their microscopic view of microscopic trifles, spells abnormality to type of a rather sad nature. The doctors regard the menses and pregnancy as most useful ballast to stay her too rapid flight into masculinity. One she may refuse, and that is often disadvantageous to her real growth, but the other is her heritage and not at her own disposal. With regard to a possibility of her taking to fighting with talon instead of tongue, the muscular may prove to be a wholesome substitute rather than a vicious procedure, and researches into the relative strength of the normal man and

woman have shown that there is no real difference as regards the "strength factor," though desuetude of certain muscles has made a difference, but one which may be overcome, and will be overcome, now that woman is doing field and other manual labor. Periodic disability in women without organic disorder does not lessen their racial efficiency. As to swearing and slang, their powers in these are merely repressed, though perhaps their terms are not quite so varied in expression as that of sinful man, still, being more emotional and imaginative, she may even come to excel him. "War is hell" and Paradise is closed—where will Eve stand when peace comes once more?—*New York Medical Journal*, July 27, 1918.

Enrollment of Physicians by Council of National Defense.

On August 8 the following statement was authorized by the War Department, signed by Newton D. Baker, Secretary of War:

"The War Department today has suspended further volunteering and the receipt of candidates for officers' training camps from civil life. This suspension will remain in force until the legislation now pending before the Congress with regard to draft ages is disposed of and suitable regulations drawn up to cover the operation of the selective system under the new law."

Fearing that this order might be misinterpreted by doctors who would not distinguish between enlistment as a private soldier and enrollment as an officer in the Medical Reserve Corps, on August 9 I asked the Secretary of War to issue a statement making clear this point.

In response to this request on August 10 the following statement was authorized by the War and Navy Department:

"Orders issued by the War and Navy Departments on August 8 suspending further volunteering and the receipt of candidates for officers' training camps from civil life do not apply to the enrollment of physicians in the Medical Reserve Corps of the army and the Reserve Force of the navy. It is the desire of both departments that the enrollment of physicians should continue as actively as before, so that the needs of both services may be effectively met.

"NEWTON D. BAKER, Secretary of War.

"JOSEPHUS DANIELS, Secretary of the Navy."

It is desirable that the definite attention of the medical profession be called to this interpretation in order that enrollment for the Medical Reserve Corps of the army and the Reserve Force of the navy which is going on so rapidly at the present time shall not be interrupted. Trusting that you will give this prominent space in the next issue of your journal and such editorial comment as you may deem desirable, I am,

Yours very truly,

FRANKLIN MARTIN,
Chairman General Medical Board.

BOOK REVIEWS.

TROPICAL DISEASES. A Manual of Diseases of Warm Climates. By Sir Patrick Manson, G.C.M.G., M.D., LL.D. (Aberd.), Hon. D.Sc., Oxon., F.R.C.P., F.R.S., etc. With 12 color and 4 black-and-white plates and 254 figures in the text. Sixth edition, revised throughout and enlarged. New York: William Wood & Company, 1918, \$6.

The new sixth edition of Manson, which is undoubtedly the most popular manual on tropical medicine printed in the English language, will be generally welcomed by most workers in tropical diseases and allied sciences. The author has made an attempt to thoroughly revise it, and has brought it up to date in most instances. It is regrettable that, with the increase in size, the publisher did not change the form of the manual so that it would be a more handy volume and less bulky and cumbersome.

Undoubtedly the greatest disappointment of the volume is the chapter on pellagra. Despite the efforts of the author, this chapter may be considered quite antiquated and obsolete. The author is, perhaps unsuspectingly, supporting rather fully the simulum theory as to the etiology of the disease, and he has gone into minute detail along these lines, and with the same thoroughness has avoided the importance of vitamin deficiency and the diietic measures usually followed in these cases. In the paragraph on diagnosis he has not mentioned what is usually considered the diagnostic triad or pellagrous symptom complex. In the paragraph relating to treatment no mention is made of the importance of a full nutritious diet, yet the use of arsenicals is spoken of favorably.

For the text covering the latest advance made in tropical medicine, the chapter devoted to dengue covers completely the works of Cleland, Bradley, and McDonald, with their investigations, which showed the conveying of the infection by *Stegomyia calopus* and the innocence, in this respect, of *Culex fatigans*.

The article relating to the tse-tse fly has been very well written, and for a book of this type is very commendable.

The chapter on the schistosomes has undergone almost a complete revision, since it covers the work of Leiper on the extracorporeal life history of *Schistosomum hæmotobium*. This chapter has also been enhanced by the introduction of several of his drawings.

Dr. Harold Scott's work relating to the cause of vomiting sickness of Jamaica is recognized and is added as a new paragraph under the heading of Acker's Poison. This is the only mention of food poisoning that appears in the text.

With the appearance of this edition we feel that "Manson" still remains without a rival as a textbook on tropical medicine.

THE PRINCIPLES OF HYGIENE. A Practical Manual for Students, Physicians, and Health Officers. By D. H. Bergey, A.M., M.D., Dr. P.H., Assistant Professor of Hygiene and Bacteriology, University of Pennsylvania. Sixth edition, thoroughly revised. Philadelphia and London: W. B. Saunders Company, 1918, \$3.50.

The sixth edition of this text on hygiene, which is one of the few American books devoted to the subject, has apparently been rushed to the printer without the author carefully revising some of the chapters devoted to those hygienic

principles and methods in preventive medicine which have advanced markedly in the last few years. It is regrettable that in this newly revised edition these parts have not been brought up to date.

We feel that in the chapters devoted to ventilation not enough stress is laid on the importance to the relative humidity of the air. This "air-conditioning" is now known to be of cardinal importance for proper ventilation, and deserves more emphasis than the author has given it.

The chapter on military hygiene is surprisingly deficient. Coming out at this time, we should expect it to contain a great deal more relative to military conditions. We find very little regarding venereal diseases and venereal prophylaxis, and apparently nothing relating to camp diseases and their prevention, other than two paragraphs of a vague, general import.

The paragraph devoted to pellagra, under nutritional diseases, is lacking in reference to the more modern work, and leaves the reader to believe that the simulum theory still remains disproved at this time. Nile's work regarding the infection and the intoxication theory of Lambroso is mentioned, while no allusion whatsoever is made to the importance of vitamine deficiency and the diatetic measures usually followed in cases of this nature.

We note in the paragraph on spotted fever of the Rocky Mountains that the author has conveyed the idea that the etiological factor of the fever has been definitely decided. This, we are quite certain, is taking a rather advanced stand. No mention is made of Rickett's work pertaining to this infection.

In the paragraph relating to trypanosomiasis we find no mention made of *trypanosoma cruzi*, which should be placed under this heading. Though a minor part of criticism, we hardly consider it justifiable that *Trypanosoma equiperdum* should be classed under *Trypanosoma rongeti* (evidently *rougeti*) and *Trypanosoma equinum* should be classed under *Trypanosoma elmassiani*. This classification is rarely used, and, in fact, Doflein today barely suggests this unusual classification.

Taken as a whole, it appears that the author has been compelled to hurry his manuscript for this edition, and therefore these revisions have been overlooked by him. We trust that the next edition may be brought to the public notice under conditions which are more favorable, since the book has established by its previous editions more or less of a following among workers in hygiene.

PHARMACEUTICAL BOTANY. By Heber W. Youngken, Ph.G., A.M., M.S., Ph.D., Head of the Department of Botany and Pharmacognosy in the Philadelphia College of Pharmacy; Member of the American Pharmaceutical Association, Academy of Natural Sciences of Philadelphia, Botanical Society of America, Botanical Society of Pennsylvania, American Association for the Advancement of Sciences, etc. Second edition, revised and enlarged, with 195 illustrations. Philadelphia: P. Blakiston's Son & Co., \$2.

The author states, in his preface to the second edition, that he has taken cognizance of the growing importance of botany in the curricula of pharmaceutical institutions, and has accordingly expanded on the subject matter of the former text. With this in mind, we cannot understand why the author has arranged his text in the confused manner that he has.

Chapter II, following the usual introductory chapter, is devoted to the life history of the male fern. This, in turn, is followed by chapters III and IV, which are devoted to the life history of the gymnosperm and the angiosperm. This arrangement is quite illogical. After the beginner in botany, such as are most pharmaceutical students, has been completely confused by these three chapters, which are advanced work, he takes up elementary botany under the title of vegetable cytology. It would be much better to give the student in pharmacy a general course in botany, or at least a course founded on a thorough study of the basic principles of elementary botany, and not attempt

to give the student advanced work in such a fashion that he will have a mere knowledge of a few botanical terms and no acquaintance with the fundamental principles.

The paragraphs pertaining to the bacteria are rather didactic, and possibly better results could be obtained by referring the student to one of the modern texts.

We trust that in the next edition of this text the author will attempt to give in a more thorough manner the elementary work which a pharmacy student should have, and decrease that work which he becomes only slightly acquainted with. Such meagre paragraphs as those pertaining to the uredinales can scarcely be justified, and are often more confusing than enlightening.

PREVENTIVE MEDICINE AND HYGIENE. By Milton J. Rosenau, Professor of Preventive Medicine and Hygiene, Harvard; Director of the School for Health Officers of Harvard University and the Massachusetts Institute of Technology, etc. With chapters on Sewage and Garbage, by George C. Whipple, Professor of Sanitary Engineering, Harvard; Vital Statistics, by John W. Trask, Assistant Surgeon-General, United States Public Health Service; Mental Hygiene, by Thomas W. Salmon, Medical Director National Committee for Mental Hygiene, etc. Third Edition. Containing a special section on Military Hygiene. New York: D. Appleton & Co., 1917.

The present edition may be regarded as dealing with military "hygiene," either directly or indirectly. Besides the usual chapters on communicable diseases, good vital statistics, etc., there are special chapters dealing with military matters and the diseases to which soldiers are especially prone; also those special forms of disease which have become more prevalent owing to conditions in camps and on the battle field. The so-called "war diseases," such as trench fever, war nephritis, shell shock, etc., are considered separately.

We realize, of course, that our knowledge of these conditions is at present limited, and that not until sufficient material has been gathered and thoroughly sifted and investigated shall we be able to form definite opinions and draw definite conclusions. But it is valuable for us all, at present, to have even a conditional knowledge of these now very important ailments.

The third edition, like its predecessors, deals thoroughly and masterfully on the subject matter, is broad in its scope, and contains many valuable statistical and historical data. It is a book which can be most heartily recommended, and is without doubt the best in its class in this country.

INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles. By leading members of the medical profession throughout the world. Edited by H. R. M. Landis, M.D., Philadelphia, with the collaboration of Chas. H. Mayo, M.D., Rochester. Volumes I, II, and III. Twenty-seventh series, 1917. Philadelphia: J. B. Lippincott Company. \$2.

In International Clinics we have a collection of clinical lectures and original articles of very unequal quality. While some of the articles are very good, others fall far below the average. Especially the articles on psychiatry and neurology do not measure up to the standard of the others. Many articles could be improved by condensation, since they neither offer anything original nor present old matter in a new form. It would, however, be unjust not to state that these volumes also contain much that is new and interesting. The clinical lectures frequently present excellent reviews, and the original articles are often not only new, but also valuable.

In volume I the chapter on "Progress of Medicine During the Year 1916" is a condensed summary at once instructive and comprehensive, at least as far as American literature is concerned.

A HANDBOOK OF PRACTICAL TREATMENT BY MANY WRITERS. Volume IV. *The Newest Treatment*, edited by John H. Musser, Jr., B.S., M.D., Associate in Medicine in the University of Pennsylvania, Philadelphia, and Thomas C. Kelley, A.M., M.D., Instructor in Medicine in the University of Pennsylvania, Philadelphia. W. B. Saunders Company, 1917, \$7.

There is scarcely anything else that the modern physician will appreciate so much as the possibility of keeping abreast in his science without being forced to spend an undue part of his time in seeking out the essential and important records of new methods and new principles. In this respect the fourth volume of "Practical Treatment," in giving the "Newest Treatment," presents in the most convenient form a survey of all that is really important in therapeutics. The volume contains a discussion of only those disorders in the treatment of which there have been marked innovations, the reader being referred to previous volumes for all further information. Especially valuable and important are the chapters treating of sorotherapy. The list of contributors is in itself a guarantee of excellence. The title of the volume is ambitious and promises much. The promise is kept to its fullest extent.

HUMAN PHYSIOLOGY. By Professor Lingi Luciani, Director of the Physiological Institute of the Royal University of Rome. Translated by Frances A. Wilby, with a preface by J. N. Langley, F.R.S., Professor of Physiology in the University of Cambridge. In five volumes. Volume IV is edited by Gordon M. Holmes, M.D., *The Sense Organs*. New York: The MacMillan Company, 1917, \$5.25.

In an otherwise excellent book we are frequently disturbed by the fact that the author, in trying to make himself perfectly clear or to bring out some difficult point, employs language which is, though very precise, hard to read and difficult to understand. That entails great effort for the reader, and causes him to regret that his enjoyment of a book that he values highly is thereby curtailed. Not so with Luciani; though treating his subject matter with masterful thoroughness and with an abundance of historical and experimental detail, he at all times preserves a style of writing which is both brilliant and lucid. Fortunately this fluency and clearness have not suffered from the transposition from Italian into English; in fact, one may say that the translation fulfills the highest requirement, and one forgets that he is reading a translation.

MANUEL DE PSYCHIATRIE. Par Le Dr. J. Rogues de Fursac, ancien chef de clinique a la Faculte de Medecine de Paris; Medecin en chef des Asiles de la Seine, expert pres les Tribunaux. Cinquieme edition revue et augmentee. Paris: Librairie Felix Algan, 1917, 7 francs 70.

This fifth edition is revised, and contains new chapters, of which the most interesting to us at present are probably those treating of the so-called war psychoses. They are classed by de Fursac under the "Psychoses Traumatiques et emotionnelles," and he considers them as forms of emotional psychosis, giving interesting descriptions of the various symptom complexes and their origins.

The classification of the psychosis followed throughout the book is in general that of Virapelin, with a few modifications based on the investigations of de Fursac and other French authors.

THE CLINICAL PATHOLOGY OF THE BLOOD OF DOMESTICATED ANIMALS. By Samuel Howard Burnett, A.B., M.S., D.V.M. Professor in Comparative Pathology, New York State Veterinary College, Cornell University, Ithaca, N. Y. Second edition, revised and enlarged, with four colored plates and twenty-three figures. New York: The MacMillan Company, 1917, \$2.25.

This book is intended primarily as a textbook of hematology for veterinarians. But just as comparative anatomy has aided us materially in the better understanding and interpretation of human anatomy, so the comparative study of

the blood is certain to furnish us new clews for investigation in human hematology, and any help which will enable us to rid ourselves of the tangled web of theory, conflicting and contradictory, which now forms the greater part of our knowledge of hematology should be most gladly accepted.

CLINICAL BACTERIOLOGY AND HEMATOLOGY FOR PRACTITIONERS. By W. D'Este Emery, M.D., B.Sc., London, Director of the Laboratories and Lecturer on Pathology and Bacteriology, King's College Hospital, and Lecturer on General Pathology, London School of Medicine for Women; formerly Hunterian Professor Royal College of Surgeons. Fifth edition. Philadelphia: P. Blakiston's Son & Co., 1917, \$2.75.

In the fifth edition additions have been made enlarging still more the scope of a book treating many topics in a very limited space. Originally intended for practitioners, it now comprises many methods of examination which are utterly impossible for practitioners. On the other hand, it is not detailed and comprehensive enough to serve as a laboratory manual. Some of the photographic plates of bacteria, as also some of the other illustrations, are not good.

AN INTERMEDIATE TEXTBOOK OF PHYSIOLOGICAL CHEMISTRY, WITH EXPERIMENTS. By C. V. J. Pettibone, Ph.D., Assistant Professor of Physiological Chemistry, Medical School University of Minnesota, Minneapolis. St. Louis: C. V. Mosby Company, 1917, \$2.50.

It is the author's purpose to supply an intermediate text for students who already have a knowledge of organic chemistry and are now taking up the fundamentals of physiological chemistry. For this purpose the book is divided into two parts. The first part is theoretical, the second giving practical instruction in laboratory work. The book is written in a manner to make physiological chemistry as interesting as possible to students. The directions for laboratory work are clear and comprehensive, and at the same time brief.

TALKS ON OBSTETRICS. By Rae Thornton La Vake, M.D., Instructor in Obstetrics and Gynecology, University of Minnesota; Obstetrician-in-Charge of the Out-Patient Obstetric Department of the University of Minnesota, etc. St. Louis: C. V. Mosby Company. 1917, \$1.

This little volume is offered to the profession as a mere supplement to the usual textbook of obstetrics. In the form of informal talks or lectures to students the author presents his personal views concerning many obstetric problems, chiefly operative procedures. These talks will prove valuable not only to the student, but particularly to the practitioner, since they embody the results of very extensive personal experience and abound in helpful advice.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

SEPTEMBER, 1918.

No. 9

EDITORIAL.

THE CLASSIFICATION OF HEMOLYTIC STREPTOCOCCI.

Kinsella and Swift have carried out a very interesting and important research, as noted in their latest contributions in the August, 1918, issue of the *Journal of Experimental Medicine*. They isolated a number of strains of hemolytic streptococci, and applied complement fixation methods in an attempt to classify them. This is truly a step in the right direction, for too long have we been satisfied with studying the ordinary cultural characteristics of these and other bacteria. In a previous publication they showed, with respect to nonhemolytic streptococci, that no two of the 28 strains studied were exactly identical. Their previous results showed a high degree of variability in nonhemolytic streptococci. The present contribution showed exactly the opposite—namely, that most of these hemolytic streptococci react similarly as gauged by complement fixation methods. They did not utilize the agglutination method of study for the self-evident reason that most of these strains will show spontaneous agglutination when grown in plain broth.

Something might be said in reference to their method of study. For testing the effect of streptococci on red blood cells, dilutions of a 24-hour culture in broth were made in a row of small test tubes, using plain broth as a diluent. Each tube contained 0.5 c.c. of culture dilution, and the doses were graduated in the following manner: the first tube contained 0.5 c.c. of culture; the second, 0.25; the third, 0.12, etc. To each tube 0.5 c.c. of 5 percent saline suspension of sheep red blood cells was added. After one hour incubation in the water bath at 37° C. the mixtures were examined to see if hemolysis had taken place. Streptococci either hemolyze the cells, produce methemaglobin in the unhemolyzed cells, or have no effect upon the cells. Fermentation reactions were made in litmus milk and in media containing lactose, raffinose, inulin, salicin,

and mannite as test substances. The media were prepared by adding 1 percent of the carbohydrate test substance to serum water. In examining the effect of streptococci on these substances, a tube of each was inoculated with 0.2 c.c. of the actively growing broth cultures and incubated for ten days. For the animal immunization a rabbit was used for each of the 28 strains. The best results were obtained by injecting freshly killed broth cultures; first dose consisting of 1 c.c. of a broth culture heated to 56° C. for one hour; the second, 2 c.c.; the third, 5 c.c.; the fourth, 10 c.c.; and the fifth, 20 c.c. at four-day intervals. When the 20 c.c. dose was reached, a second series of inoculations were made, beginning with 1 c.c. of broth culture, increasing same as the first series. Complement fixing bodies appeared in from six to ten injections. As soon as a serum fixed its own antigen, it was tested the following day against the other 28 strains. The complement fixation was carried out as follows: 0.05 c.c. of streptococcus antigen, 2 units of complement, 2 units of antishoop amboceptor, and the following amounts of immune serum: 0.1, 0.05, 0.025, etc. The mixture was made up to 1.5 c.c. with saline, incubated at water bath temperature 37° C. for one hour. Sensitized cells were added and incubated as before for one hour. Reactions were then read off. The antigens were then prepared as follows: the washed sediment of a 24-hour culture was desiccated in vacuo. The sediment was then ground into a fine soft powder and weighed; 10 mg. were dissolved in 5 c.c. of a 2-percent antiformin solution in the water bath at 56° C., and the solution neutralized by using litmus paper as an indicator with 0.1 N sulphuric acid. The free chlorine was liberated by adding 1 or two drops of 5-percent sodium thiosulphate. The absence of free chlorine was determined by testing with potassium iodide starch paper. The solution was made to 10 c.c. with carbolyzed normal salt solution and centrifugalized. If a sediment appeared, it was discarded. One c.c. of the antigen then represented 1 mg. of dried, ground bacterial sediment.

The 28 strains were derived from all kinds of pathological cases which ordinarily yield them—namely, abscesses, sore throats, pus from tenosynovitis, cellulitis, septicemia, meningitis, blood culture, scarlet fever blood cultures, postmortem blood clots, erysipelas, etc. All the strains hemolyzed blood cells and produced a clear zone around their colonies on blood agar plates. Occasionally a strain was not gram positive, the cause of which was not determined. These strains, as a rule, are weak fermenters.

So far as complement fixation was concerned, which was the basic phenomenon looked for, each strain caused fixation of complement with all antisera. This work proved that hemolytic varieties of streptococci are homeogenous, and that the homeogeneity is displayed in the behavior of all these strains to complement fix-

tion. This is an important research, and should, and undoubtedly will, be carried further. Methods of bacteriological identification, as intimated above, must in the future be based rather on biological activity than on cultural characteristics *in vitro*.

THE VOLUNTEER MEDICAL SERVICE CORPS.

In the early days of the enrollment of members for the Medical Reserve Corps of the United States Army for service in the present war, how frequently one heard some elderly but hale physician express, in language which matched the vigor of his body, his indignation at being turned down because he was over fifty-five years of age. Or again how often has a seemingly suitable candidate for the medical service of the Army been rejected for some latent defect which was not entirely curable.

Others who were willing to serve, physically fit, and within the age limits were unable to place their services unreservedly at the disposal of the Army because of the dependency of others on their professional earnings.

To provide for the due utilization of the services of such men, the Volunteer Medical Service was formed in January last, under the authorization of the Council of National Defense. While this action placed at the disposal of the Government a reserve of experienced physicians for special and limited services, and while it removed from all those who were not commissioned the undeserved stigma that might attach to this state, the woman physicians were still left out of the organization.

On August 5th the Council of National Defense authorized a change in the scope of the organization and an increase and amplification of its Central Governing Board. The organization of the corps as now authorized, makes eligible to the Corps every legally qualified physician, including women physicians, holding the degree of Doctor of Medicine from a legally chartered medical school, without reference to age or physical disability, provided he or she is not already commissioned in the Government service. This organization has now the approval of the President as indicated in a letter addressed to Dr. Franklin Martin.

It will thus be seen that, with the exception of a few physicians, graduates of British medical schools, who have obtained their license to practice in this country, but who do not possess the degree of Doctor of Medicine, every regular physician has now an opportunity of showing his patriotism by joining the Volunteer Medical Service Corps, and by placing his services at the disposal of the Government.

The Volunteer Medical Service Corps is exactly what its name

indicates. It is based on a gentleman's agreement between the civilian doctors in the United States who have not yet been honored by commissions in the Army and Navy, and a representative board of governors consisting of officials of the Government associated with members of the profession, in which the civilian physician agrees to offer his services to the Government if required and asked to so do by the Governing Board.

It is a method of recording all physicians who are not yet in service and classifying them so that their services when required will be utilized in a manner to inflict as little hardship on the individual as possible. It is a method by which every physician not in uniform will be entitled to wear insignia which will indicate his willingness to serve his Government.

As more than sixty percent of the physicians of the country will be utilized in caring for the industries at home and the health of the home people, this large percentage of necessity will be expected to maintain their home status and continue their ordinary professional work.

It should be unnecessary to emphasize the imperative character of this call upon our profession. It should be expected that every legally qualified physician within the limits before mentioned will, without delay, enroll himself as a member of this organization.

AFTER THE WAR.

Under the title "Health and War," Irving Fisher, professor of political economy at Yale University, discusses, in a leading article in *American Journal of Public Health* for August, a number of hygienic problems likely to be acutely pressing for solution immediately after demobilization.

The crux of the situation Prof. Fisher foresees is in the relation of labor to the public health. It will be necessary, in order to prevent the grave consequences of labor discontent, to make life better worth living for the workingman.

The distinguished economist's view of the present situation is that the employer regards the employed as being primarily and almost exclusively interested in his pay envelope. In other words, the employer recognizes in his employee only the instinct of self-preservation, ignoring the six, or so, other innate instincts which Prof. Fisher believes implanted in each of us. Of these the instinct of workmanship, which is perhaps synonymous with or derived from the instinct to excel, is the most important adjuvant to contented and satisfactory labor.

Prof. Fisher cites the successful application of this principle in the case of a wood-pulp mill. In this instance one of the devices

adopted was that of encouraging men to make graphs of the progress of their work. The dead monotony was broken, the instinct of workmanship aroused, and the mill, without increase of equipment, doubled its output, improved the quality of the product, and is now running with a contented and well paid personnel.

When the soldiers return to civil life, they will not, with ease, settle down to the monotonous, driven methods so dear to the so-called "efficiency experts," so appalling to the more farsighted, better informed and broader minded vital statistician. Work must be made more interesting and more wholesome: life and not mere existence must be provided for those who come from high adventure to take up the threads of civil life once more.

EDITORIAL COMMENT.

Physicians who contribute to the lay press occasionally produce somewhat astounding articles. There has recently appeared in a Chicago evening paper an article on cheese by a person conspicuous in dietetic circles.

This article was full, from the first word to the last, of half truths and fallacious interpretations. It condemned cheese in all forms as an article of diet. It would be tedious to mention all the arguments used and to refute them. They were, moreover, not worthy of such serious treatment. Two of them stand out as being less obviously fallacious than the others, and therefore more dangerous. The first was the statement that cheese, on account of the enormous number of bacteria it contains was a dangerous food. The second, that, on account of its high content of nitrogen, it was undesirable. In other words, because it is such a concentrated form of food it should not be eaten, even with other food. The article could not have been made more misleading had it been written to order to serve a particular interest. But, from a physician who, in another place, has described Virchow as the greatest scientific man of the nineteenth century, thereby placing him above such giants as Faraday and Pasteur, an oblique view of scientific subjects is perhaps to be expected, however meritorious his personal services in his specialty.

Time deals harshly with some men by letting them live.

How often one hears it said of some statesman of the past, "If only such a one were here to take the helm, how differently and how much better would the Ship of State sail!" Such men, or rather their reputations, are favored by having been cut short.

It is certain that had the Marquis of Lansdowne, one of the triumvirate who engineered the Entente, disappeared from the

scene before the outbreak of this war, his absence would have been regretted in some much terms as those above cited.

Coffee is often blamed for sins for which it is not directly responsible. The citizen who, having consumed a fairly heavy dinner, adds to it a salad of fearful and wonderful composition containing such strange associates as pineapple, oil, Roquefort cheese, and lettuce, a mixture calculated to make the body of Brillat-Savarin turn in its grave, as it certainly would have made his stomach turn during his life, then swamps it with a large cup of coffee, when the natural consequences presently ensue he will, with a sigh, remark that he must cut down on coffee because it doesn't agree with him.

More often it is the fastidious and esthetic coffee which sulks at finding itself in such barbarous company.

Detective work is not in any country as interesting as it is generally supposed to be, but at least in most countries this branch of police work is not obstructed by the activities of the reporter. At the time of writing a man is being sought for as a suspect in a sensational murder. One reads, in Chicago's most distinguished newspaper (not the w. g. n.-p.), that the police are watching certain rooming houses and resorts for the suspect, and also certain places where he was wont to receive his mail. It is difficult to figure to oneself the conception of civic duty possessed by the journalist who permits these facts (*if they are facts*) to be published. The majority of criminals read all that is printed about their crime and this trait not infrequently serves as one of the elements in their apprehension.

Read on the same day in Chicago:

"For new construction camp, North Dakota, laborers wanted at once: \$4.50 a day and first-class eats." "Wanted a physician, not liable to draft, graduate of A1 school, as resident physician in hospital of 100 beds; must be able to take charge of clinical laboratory: \$1,200 and maintenance." In the annual report of Dr. John R. Ross, superintendent of the Dannemora State Hospital for "Insane Criminals:" . . . the dearth of help in the hospital is not due to war conditions, so much as to inadequate wages, to expect good service for \$45 a month is not consistent."

Make your own comment.

An advertisement in an esteemed New York medical contemporary reads:

"Electric chiropractic college, affiliated with * * * Nature and Health Resort. . . . A Special Post Graduate Course for Practitioners begins October 1, 1918. *Handsome diploma conferring the degree of D. C. (Doctor of Chiropractic) issued to graduates.* For particulars address * * * N.D., D. C., Dean.

The italics are ours.

COLLECTIVE ABSTRACTS

MILITARY ORTHOPEDIC SURGERY.

By ARCHER O'REILLY, M.D., of the Editorial Staff.

With the progress of the war the orthopedic surgeon has assumed a more and more important role in the medical branch of the army and in war surgery. In training it is his duty to see that the recruits are free from deformities, and that those with potential static weaknesses may be properly trained, so that these weaknesses may not develop, or that they may be cured. Probably the most important duty to the recruit is looking after the feet, seeing that the men are properly shod and, by proper exercises and shoes, preventing potentially weak feet from breaking down under the unaccustomed strain of military training.

The orthopedic surgeon also has come into his own in the treatment of the wounded and in the correction of the inevitable defects which result from war casualties. "It was estimated at the end of the first year of the war that in Great Britain from 30 percent to 40 percent of the war casualties required orthopedic treatment, either in the way of preventing deformities, or in doing actual corrective surgery, or in the reconstruction and educational work." (Porter.¹)

With this percentage and with an army of over 3,000,000 men, not only will the army need every orthopedic surgeon in the country, but it will need a large number of new and younger men who are partly trained in orthopedic surgery, or who are interested in the specialty. In fact, the Division of Orthopedic Surgery has recently sent out a circular letter asking for a list of these men.

In Canada the orthopedic surgeon has supervision of the following types of cases:

1. Bone lesions, united and ununited fractures.
2. Nerve injuries, complicated by fractures and contracted scars, including nerve suture.
3. Acute and chronic disabilities of joints, including ankylosis and loose and fractured semilunar cartilages.
4. Injuries of muscle, ligaments, and tendons, with stiffness of joints.
5. Deformities and disabilities of feet, hallux rigidus, hammer toes, metatarsalgia, painful heels, flat and claw feet.
6. Cases requiring tendon transplantation, and other measures for irreparable damage to nerves.
7. Cases requiring surgical appliances.
8. Amputation, stumps requiring trimming and fitting with artificial limbs.

"It is estimated that about 70 percent of the returned surgical cases are orthopedic, and about 20 percent of the entire casualties fall into these classes. About 20 percent of the orthopedic cases are operative. The rest are non-operative and require apparatus to prevent or correct deformity, and massage electrotherapy, hydrotherapy, and active work to restore the function of damaged muscle and joint structure." (Starr.²)

It will be seen that this embraces a large field and requires a well-trained surgeon and one who has had special training in this field.

Most of the orthopedic work must be done at one of the orthopedic hospitals back from the front. The work has been greatly retarded and complicated owing to the great amount of sepsis, as practically all war wounds were considered infected. This interfered especially with the proper repair of fractures.

Baer³ tells us, however, that the introduction of primary and delayed primary suture has greatly changed the results of war surgery. He says the following principles of war surgery have been established and have been founded on no uncertain grounds:

1. All battle casualties are to be considered as infected.
2. It is necessary to remove all projectiles, clothing, and devitalized tissue, as early as possible—at least before the twelfth hour after injury.
3. These wounds can then be considered as aseptic in character and a primary suture made, thus converting compound fractures into simple fractures, and appropriate treatment for these simple fractures instituted.

One cannot but stand in awe and wonder at the results which have been achieved as he compares the present with the past—pus, with a clean lineal scar; continued pain caused by the packing of gauze and constant irrigation, with the peace of being left alone; the long and often painful process in the restoration to function, with function restored almost voluntarily and swiftly; weeks and months of treatment, with recovery in a comparatively short time.

Every battle casualty is x-rayed immediately and a definite description of the fracture is given, and, if any projectile is present, it is accurately localized. A bacteriological examination is also made immediately. It has been found that 90 percent of the wounds are infected with one or more organisms. It has been found by experience, however, that, unless the virulent streptococcus is present, the wound can be closed by primary suture with the proper technic. The skin is disinfected, the skin edge is removed together with the tract made by the projectile, and also all projectiles and all devitalized tissue. There must be complete hemostasis. Accurate approximation of the skin edge without tension is necessary, and where this is impossible on account of the destruction of tissue it may be accomplished by a skin flap.

Primary suture may be done in from 80 percent to 95 percent of all battle casualties if operated upon within the first twelve hours. If the bacteriological examination shows the streptococcus present, the wound must be immediately reopened.

Delayed primary suture is done in those cases where circumstances, usually of a military nature, prevent primary suture from being done. The technic is the same, except that the skin is not closed, and a dry sterile dressing is placed over the wound. The skin edge is brought together from three to eleven days later.

Up to the present time the orthopedic surgeon in the American army has had to deal mainly with the recruits, and in these the main problem has been that of the feet.

Theoretically, according to Rugh, the problem of foot prophylaxis in the soldier is easy of solution, especially to the surgeon who has had no experience in military service, but practically it is surrounded by so many adverse factors that, taken as a whole, it has proved extremely difficult. To deal properly with these conditions requires that the surgeon see the soldier when he is first inducted into service. If careful inspection could be made at this time and proper remedial measures outlined, 90 percent of the foot inefficients could be eliminated. But this plan has not been feasible thus far.

The feet present all types and conditions. The great variations of the arches are striking. Many of the soldiers from rural communities, especially in the

South, have walked much barefooted and have developed a physiologic low-arched foot, which, at first glance, appears flat, but which shows, on closer inspection, an absence of pronation at the transtarsal articulation. The fullness along the inner border of these feet is due to a pad of fat, muscle, and fascia, and not to alteration of the scaphoid and astragalus relations. "Examination of 50,000 soldiers of all classes and walks of life showed 27.5 percent of feet in abduction and pronation, classified as functionally weak feet. In these cases 8.3 percent had short heel tendons. This factor is one of the most potent for disability that we have found in our inspections." Bad shoes have caused a good number of foot disturbances, but these have disappeared within six months' wearing of the army shoe. Weak muscles are also an important factor in disability. The recruit is apt to be given too much work or too heavy loads to carry before his muscles have become accustomed and hardened to the new work, and it is much more difficult to cure these cases than it is to prevent them. The question of shoes has been solved by the use of the Munson last.

5. "With the wearing of the Munson shoe, corns, callosities, ingrown nails, overriding toes, blisters, and other similar conditions disappear." There is great difficulty, however, to get the men to wear the proper-sized shoe. Their vanity is affected, and, when properly fitted, there is a great tendency for them to swap shoes until they get a pair which suits their taste rather than their feet. If the soldier could be fitted with shoes as soon as he entered the service, and if these could be properly altered to correct any tendency toward weakness, a great deal of disability could be prevented, but this is not always possible.

There are four prophylactic measures that have proved most potent:

1. The detection of potentially weak feet by intensive inspection, accompanied by proper mechanical and corrective measures. *

2. Restoration of the balance of the foot by the proper alteration of the shoe.

3. After training follows the problem of reclamation, and the first essential is that of proper walking and standing. So many soldiers have never given a thought to the manner of their posture or gait, and this should be taught in connection with the other forms of exercises, both corrective and postural.

4. Exercises for the restoration of muscle power. "The question of corrective operations in cases of potential disabilities, such as hallux valgus, hammer toes, spurs, exostoses, short heel tendons, etc., has not yet been solved, but should be approached with the utmost caution and under the most favorable and carefully prepared conditions, so that warped mental disabling sequelæ do not follow. The proper place for this work is in a reconstructive hospital, not in a base hospital. In civil life these operations would be relatively simple, but in military service there are many obstacles to success, and one of additional importance is the protection of the Government against unjust and false claims after the war is ended."

6. Francisco⁵ writes from France: "The foot conditions of our army have been quite a serious problem, and will continue to require considerable attention in order to keep the men up to a good physical standard." One of the main difficulties has been in securing shoes large enough. Under the conditions of war the feet increase about two sizes. The smallness of the shoes is particularly noticeable in winter, when the men are required to wear two pairs of socks and when the shoes are more apt to shrink on account of the constant wetting. He believes that by the use of extra socks and large shoes an essential move has been made in overcoming trench foot, which is now believed by the army to be a preventable disease." In the near future trench feet will be considered to result from cold, pressure, dampness, and muscular in-

action, all of these factors being largely overcome by shoes that are sufficiently large to allow for extra socks, which, of course, will require frequent changing and permit muscular activity of the foot."

Francisco also urges very strongly that men who have marked deformities of their feet, such as hallux valgus, hammer toes, and rigid flat feet, should be rejected in case it is not possible to restore suitable function by means of orthopedic operations. It seems to us over here that the examining boards, particularly of the drafted men, have been entirely too diligent in their efforts to prevent a possible slacker escaping, and have accordingly passed many men who should have been rejected on the condition of their feet.

In the 26th Division a special training battalion has been established for the reclamation of as many men as possible who have broken down in performing their military duty, to detect the cause of the breakdown, to correct the defect, and to return the men in a much improved physical condition and capable of full combat duty. It was found that this work was mostly orthopedic. The men are carefully examined and a record made of their condition. The more serious cases are sent to a base hospital for treatment. There are four classes of cases:

Group 1. Men with slight pronation and faulty posture. Without symptoms.

Group 2. Men with severe pronation, moderate hallux valgus, and metatarsalgia."

Both these groups require simple good shoeing, exercise, and training.

Group 3. Men with acute strain and sprains, contracted tendons, spasm, faulty posture, with back strain. These men require more special treatment over a longer period.

Group 4. Men with serious defects requiring operation or permanently disabling them, who will never be fit for combat duty. The camp is not a convalescent hospital or rest camp; all the exercises are done out of doors and the program is carried out without regard to the weather. The work is all of a military nature, and carries on the instruction and training of the men which fit them for active combat duty in the line. The progression is through four or five companies, and the work is made more vigorous and prolonged by each stage of the advancement. No men are advanced from one company to another without an examination with and after the consent of the orthopedic surgeon. In the top company the work is very hard and continued through long intervals; all the hikes of this company are with full equipment.

In addition to the feet, physical inefficiency in the army, other than that due to organic disease, is caused by faulty posture. (Willard.⁷) The two are usually associated, and it is uncommon to find a man with a weak back who has not also at least potentially weak feet. The percentage of enlisted men with faulty posture is high—about 25 percent. This class includes men with the short, straight lower back, pendulous abdomen, and barrel-chest, as well as those with the long lordotic lumbar spine, flat chest, and round shoulders. The second type is more common. The number of men complaining of chronic back pain and strain is very low, probably because the military exercise and training is the very best treatment that they could get for the condition.

The military posture, with the head held up, the chin pulled in, the chest held high, the abdomen pulled in, and the lower back flattened, is the best possible position for these postural cases. The knapsack now used in the army is a splendid piece of corrective apparatus. It is long and narrow, extending from high up between the shoulder blades to the sacrum. The straps pass over the shoulders, and the whole tendency of this pack is to expand the chest, pull back the shoulders, and flatten the exaggerated spinal curves.

Many of the men with faulty posture will become efficient through the regular military method of mass training, but there will always be a certain number

who will need special care and who, by means of this special care, will eventually become first-class soldiers. Formerly these physically unfit men were discarded by the army, but today it is the duty and the privilege of the orthopedic surgeon to stop this wastage—to take hold of these men, and by careful supervision of their training put them back in the ranks of those who are capable of fighting for their country."

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ORIGINAL ARTICLES.

INFANTILE SPASMOPHILIA.

By MARK JAMPOLIS, M.D., Chicago.

From time immemorial, the convulsions and spasms of infancy and early childhood have been attributed to dentition. Even today with the tendency to bury all scientific investigations in the examination of sick infants under the diagnosis of "teething," the physician is too often ready to dismiss the case after a hot bath, a sedative drug, or a few whiffs of chloroform, with the ready assurance that it is only teething or a digestive outburst, and that the child will be well tomorrow.

Within comparatively recent times, a new conception of the condition has been evolved, on a basis of clinical studies and investigation in chemistry and metabolism.

That certain children are born with a tendency to spasms and convulsions is a fact that is now well established. To this class of children, Heubner applied the term, spasmophilia. It is not my intention here to discuss the convulsions which occur in epilepsy or in central nervous lesions, such as meningitis or cerebral hemorrhages, or in such conditions as are produced by strychnine poisoning, or extensive burns on the body, but rather to present the subject of spasmophilia in young children or as it is sometimes called the "spasmophilic diathesis."

Spasmophilia may be defined as a condition of irritability of the nervous system, especially common in early childhood, characterized by galvanic and mechanical hyperexcitability of the peripheral nerves and a tendency to clonic and tonic convulsions.

The following case history of a child suffering from spasmophilia illustrates the condition.

CASE REPORT.

Sarah Morris Hospital.

Robert F., 4½ months of age.

Admitted March 3, 1916. Discharged March 26, 1916.

Weight, 11 lbs. 8 ozs.

Diagnosis, spasmophilia.

History.—Normal birth; no coma; no hemorrhage, or asphyxia at birth. Breast fed for one month; Borden's condensed milk for two weeks. Is now receiving milk 4 ounces, water 2 ounces, dextro-maltose 2 drams, and cane sugar ½ dram; mixture given 5 times daily.

Present Trouble.—Convulsions for the past two days; cough; anorexia; insomnia, restlessness, and irritability; occasional vomiting.

Began one week ago with coryza. Nothing in particular was observed until two days ago when child had a generalized convulsion. During that day, had 14 attacks lasting from 3-5 minutes and involving the right side more often. The next two days following had fewer convulsions, but they lasted 4-5 minutes. Child has not eaten anything, is very restless and does not sleep. Cries less than usual, but has an accent of distress when he does. Has vomited once or twice. The last convulsion occurred two hours ago.

Physical Examination.—Fairly well nourished rachitic child of 4½ months. He lies listless, jumps when touched suddenly, with carpo-pedal spasm. On crying, a peculiar crowing sound is heard. On tapping the cheek with a percussion hammer, the muscles on that side of the face are thrown into a spasm. On stimulating the median nerve with the galvanic current, only 2½ milliamperes are necessary to produce a cathodal opening contraction.

This case history selected at random, illustrates the most typical phases of spasmophilia.

The three most characteristic symptoms of manifest spasmophilia are, laryngospasm or laryngismus stridulus, tetany or tonic contractions of the extremities, and generalized convulsions.

Laryngospasm presents itself in a variety of ways, depending on the severity of the spasm. In the mildest cases, there is noticed, when the child laughs or cries, an inspiratory crowing sound, resembling the crow of a rooster. In repose, the child shows no apparent respiratory embarrassment. This crow is usually the earliest sign of manifest spasmophilia, and should lead the physician at once to institute active prophylactic measures.

If the condition is allowed to pass unnoticed, the laryngeal spasm may become more marked and lead to attacks of apnoea or arrested respiration. The child suddenly becomes pale, the head falls back, breathing stops, the eyes bulge, the child attempts to breathe, the lips become cyanotic, the face gray and covered with a cold sweat. Suddenly the spasm relaxes and the child utters a few cries. A deep breath or two follows and the attack is usually over. However, these cases may end in heart failure or the child may go into another attack, or into a generalized convulsion. As many as 20 such attacks may occur in one day, some mild and manifested only by the inspiratory crow, others so severe that we fear the next breath will not come at all. The attacks are usually induced by laughing or crying or by some psychic shock. Occasionally we see an expiratory apnoea which is exceedingly dangerous.

Less frequently, and usually after laryngospasm and even general convulsions have become established, we see the condition of tetany or carpo-pedal spasm. The hands are held in the obstretical position, the feet are held in an extended equinus position, the arms and legs are rigidly flexed on the body. The tonic contractions may last for a few minutes or persist for hours, and return again at intervals.

In severe cases, other muscles may be affected. Consciousness is not lost and the infant cries and moans from pain until the spasm is relaxed. The face may be involved, showing a mask-like expression, or a contraction of the mouth, wrinkling of the forehead or opisthotonus may follow. At times, there is difficulty in urination or in swallowing. Fixed pupils, strabismus or nystagmus may be observed.

General convulsions or true eclamptic seizures, identical with epilepsy, may be observed as the first symptom. It may be said with safety that over 90 percent of all cases of general convulsions in children in the first year and a half of life may be attributed to the spasmophilic diathesis.

Numerous writers would include symptoms of the sympathetic nervous system, such as erythema, urticaria, angioneurotic edemas, pylorospasm, cardiospasm, vomiting and diarrhea.

We have so far considered the symptoms of manifest spasmophilia only. The spasmophilic diathesis usually remains latent—that is, most spasmophilic infants never have convulsions or even spasms. However, these infants may show one or more forms at any moment if any exciting cause becomes apparent. In such infants, a fright, a slight temperature, a dietary indiscretion, or an overloaded stomach, may produce an eclamptic seizure. After one or more spasmodic outbursts, the condition may once more become latent.

We can readily see the importance of the early diagnosis of spasmophilia before convulsions or spasms develop. We must recognize the fact that true laryngospasm, carpo-pedal spasm, and most of the general convulsions of children are merely manifestations of some underlying condition, a constitutional spasmophilic diathesis.

In the diagnosis of latent tetany, the increased reaction to electrical stimulation of the median or perineal nerve is most important. It appears earliest and is the most constant symptom present. Ibrahim¹ found, that, in the late winter and spring, 30 percent of all infants responded to this test.

It is believed that a cathodal opening contraction with less than 5 milliamperes of galvanic current is pathognomonic of spasmophilia. Others have found that the occurrence of an anodal opening contraction with less current than the anodal closing contraction is even a better and more delicate guide.

If one has not the means of making the electrical tests, the Chvostek sign is of great clinical importance. This is elicited by tapping the cheek over the 7th nerve. In spasmophilia, rapid contractions of the muscles of the eye or mouth usually follow this stimulation.

Trousseau's sign is less reliable. It consists of a true tonic spasm of the foot or hand when the upper arm or leg are seized with suffi-

cient pressure to shut off the blood supply. Two minutes or more may be necessary before the spasm ensues. This test is painful and may produce a general eclamptic seizure.

The relation of spasmophilia to rickets has been well established. Kassowitz² considered spasmophilia to be the nervous manifestation or complication of rickets. He also discovered the fact that tetany occurs in the late winter or early spring in the majority of cases, a peculiarity not characteristic of rickets. I believe that one may say that, in Chicago at least, spasmophilia never occurs without evidences of rickets. Most of these cases show the bony changes of rickets, and especially, softening of the bones of the skull—cranio-tabes. The fact that most observers think that there is some disturbance of the calcium metabolism in both conditions would strengthen the belief that rickets and spasmophilia are closely related.

The course and prognosis of spasmophilia depend a great deal on the diet; to a certain extent, also upon the medical treatment and management. It has not been determined what influence spasmophilia has in the convulsions of later life. Ibrahim, Thiemisch³ and others believe that a majority of spasmophilic infants, later show signs of neuropathy or mental deficiency, and that only about one-third show a perfectly normal development.

Several writers report that there is an unsuspected prevalence of a tendency to abnormal spasmophilic nervous condition in older children. Children inclined to asthenia seem most predisposed to it. An unstable vasomotor system, excitability of the abdominal vagus or sympathetic system, the facial phenomenon, and the electrical tests confirm the diagnosis of spasmophilia.

One can scarcely speak of the complications of spasmophilia. In fact the manifest symptoms of spasmophilia, itself, often appear as complications of other disease conditions, such as pneumonia and influenza. We must not consider spasmophilia as a disease but rather as a symptom complex based upon a constitutional diathesis, which remains latent until some exciting factor, as the hyperpyrexia of pneumonia, or the overloading of the stomach, or even some trivial mismanagement, produces active manifest spasms.

Diagnosis.—The electrical reactions, the mechanical tests, the characteristic laryngeal stridor, the position of the extremities during tetany, together with the finding of rachitic changes, especially cranio-tabes, in practically every case, serve to differentiate this condition from other convulsive seizures. It may be said, without contradiction, that most of the convulsions of the first 18 months of life are associated with rickets, and can be explained on the basis of the spasmophilic diathesis.

Characteristic of this type of convulsions is the tendency to repeated spasms within a short period of time.

Etiology.—Spasmophilia occurs most often in the late winter and early spring. In some cities of Europe, it appears in such numbers, as to suggest an epidemic. It is found most often in bottle-fed infants, especially those fed on cow's milk; but the breast fed are not exempt. Manifest symptoms appear most often between the ages of 6 and 15 months, the condition being latent long before an active outburst of spasm brings the physician to the bedside of the child. Heredity seems to play an important factor, as the condition is observed frequently in several children in the same family. The parents may give a history of convulsions in infancy or a neuropathic condition in later life.

It was formerly quite generally believed that spasmophilia was due to a derangement of the parathyroid gland. This hypothesis was based on the fact that a form of tetany can be produced experimentally in dogs by the removal of the parathyroids. Even in man, a similar type of tetany has been observed when the parathyroid glands have been removed along with the thyroid in a goitre operation. It was assumed that the parathyroid gland has some function to perform in the neutralization of tetany toxin, due to some disturbance in the metabolism—possibly in the calcium metabolism. Numerous investigators have described hemorrhages in the parathyroid gland at autopsy. Some authors have gone so far as to state that manifest tetany always depends upon some trauma to the parathyroids *in utero* or at birth. It is not definitely proven that experimental tetany and infantile tetany are identical. Post-operative tetany in dogs can always be made to disappear by the subcutaneous injection of an emulsion of ox parathyroid bodies, or a nucleoproteid derived from them, as Berkely and Beebe have shown.

Gerstenberger,⁴ in 1909, found no improvement in symptoms after the injection of an aqueous extract of ox parathyroid in a prolonged severe case of infantile tetany.

Most authors writing within the past two or three years do not believe that infantile spasmophilia depends primarily on a deficiency of the parathyroids.

It is generally agreed by most investigators, that there is some disturbance of the calcium metabolism in the body, either a calcium intoxication or a calcium deficiency.

It is a well established fact that spasmophilia, especially the galvanic irritability, depends to a large extent on the diet. Finkelstein⁵ noticed that spasms occurred, especially—when breast-fed infants were put on an artificial food, and that the spasms disappeared when breast milk was again given. In two of Finkelstein's cases, sudden death occurred during a spasm of the larynx, when the babies were put back on cow's milk. This writer considered cow's milk the most dangerous food in spasmophilia, and he found that the richer the diet, the more pronounced the symptoms were. The

symptoms were often entirely suppressed by a diet of weak tea and saccharin and a cathartic. Finkelstein studied the influence of the various constituents of cow's milk by adding casein, fat, and sugar to the mother's milk before feeding the spasmophilic infant, and found no change. When he added the whey of cow's milk, the electrical irritability was increased. Rosenstern⁶ and Grulee,⁷ both, found a reduction of tetanoid symptoms on the removal of whey from the food and an increase when the whey was added. This phenomenon has not been satisfactorily explained, but Finkelstein believes that the fact that cow's milk contains about five times as much calcium as breast milk, must play an important part.

Stoelzner,⁸ working along the same lines, fed the different constituents of whey to spasmophilic infants, in order to determine the causative agent. He found no increase in the galvanic irritability when he fed ferrum lacticum, potassium acetate, sodium chlorate, sodium phosphate, and magnesia usta, but dram doses of a 3 percent solution of the calcium acetate every three hours caused a heightened reaction. From these observations, Stoelzner concluded that the influence of cow's milk in increasing electrical excitability, depends upon a calcium intoxication; and he presented the following theory: A baby fed on cow's milk receives much more calcium than one fed at the breast. He believes that the absorbed calcium is not used by the organism, but is excreted through the intestinal mucosa. In the normal child the greater part of the calcium is retained by the osseous system, but in spasmophilia, because of its occurrence in association with the bone changes of rickets, most of the absorbed calcium is again eliminated and even some of the formed bone is broken down and its calcium excreted. The increased demands on the excretory functions of the intestinal mucosa, leads to calcium stagnation in the tissues and this in turn, to an intoxication of the whole organism.

This elaborate theory of Stoelzner has found but little support, either from clinical or experimental investigations.

Gerstenberger⁴ found that the subcutaneous injection of calcium lactate failed to increase galvanic excitability in the rare case of prolonged tetany mentioned before.

Cybulski,⁹ and later Schwartz and Bass,¹⁰ found that the calcium retention was least when the electrical excitability was greatest, and that it increased as the condition improved.

Quest¹¹ found that the normal calcium content of the brain of an infant between the ages of 10 months and one year is about 0.073 percent. In the brains of three infants dying with tetany at 10, 11, and at 12 months, the calcium content was diminished to 0.041 percent, 0.047 percent, and 0.053 percent, respectively.

Aschenheim¹² and Sylvestrie¹³ also found a decreased calcium content in spasmophilia, but Leopold and Von Reuss¹⁴ observed no

change. In addition to the diminished calcium content, Aschenheim also found a markedly increased sodium and potassium content.

Loeb¹⁵ has shown that osmotically active salt solutions have an effect on the excitability of the peripheral nerves, an increase of sodium or a decrease of calcium increased the irritability.

MacCallum and Voegtlin,¹⁶ observed that in parathyroidectomized dogs, the injection of calcium and magnesium salts diminished the electrical excitability, while the injection of potassium and sodium salts had the opposite effect and increased the excitability. They also found a reduction in the calcium content of the tissues and blood during tetany, and an increased excretion of calcium in the urine and feces while tetany was developing.

In 1913, Lust¹⁷ reported a case of an infant suffering from tetany associated with a severe general edema; the electrical excitability disappeared with the edema. On two latter occasions, the edema returned accompanied by tetany and both conditions disappeared together.

Brown and Fletcher¹⁸ cite this case of Lust's to support their view that spasmophilia depends not only upon a disturbance of the calcium metabolism, but also on a general salt disturbance. Observations on patients suffering from diarrhea show that, in the severe water loss through the bowel, the excretion of sodium and potassium is 8 to 10 times the normal. Brown and Fletcher believe that this fact accounts for the infrequent occurrence of spasmophilia in summer, when perspiration and diarrhea prevent the retention of these irritating salts in the body. In their opinion, spasmophilia is due to the fact that the organism has been storing up fluid in the tissues, in combination with sodium and potassium salts. This phenomenon is caused by the feeding of food high in carbohydrates, subjected to heat.

In the opinion of these investigators, calcium estimates alone do not account for the nerve irritability of tetany, but support the hypothesis that tetany results from disturbance of the concentration equilibrium of the salts, and that such salt changes are probably associated with constipation and decreased urination. However, several writers have called attention to the fact that diarrhea often occurs in tetany.

In summing up the various experiments and observations, it is evident that there is no unanimity of opinion as to the pathogenesis of spasmophilia. It is most probably due to a disturbance in the intermediary metabolism of the salts, especially the calcium salts. Stoelzner's calcium retention theory, on the basis of an intoxication seems untenable. There is undoubtedly a deficiency of calcium in the tissues. It is possible but not proved, that this metabolic disorder is due to an insufficiency or even a definite lesion of the parathyroid glands.

Treatment.—Breast milk, sunlight, and fresh air are the most reliable prophylactic measures. An infant who shows a positive facial phenomenon or increased electrical reactions, should receive breast milk. If the mother cannot nurse her baby, we should insist that a wet nurse be procured if possible. A spasmophilic baby on bottle feedings should receive a limited amount of milk—a pint, or at the most, 24 ounces in the 24 hours—to which a cereal concoction and some form of sugar is added, preferably one of the malt dextrin preparations. In this country, sufficient emphasis is not laid upon the advisability of the early addition of other foods than milk to the baby's diet, whether he be fed at the breast or by the bottle. Orange juice may be given as early as the third or fourth month. At the fifth month a feeding of cream of wheat should be added, and at the 6th or 7th month meat broth with carrots and celery cooked in, or a feeding of well-mashed boiled green vegetables. In rachitic and spasmophilic infants these feedings may be given even earlier.

Finkelstein and other observers, advocate the use of a solution of milk curds in water, to which a malt dextrin preparation has been added. In this way the whey, with its irritating salts is removed from the diet. Several cases at the Sarah Morris Hospital have been successfully treated with Finkelstein's albumen milk, a preparation made also from the curd of the cow's milk.

Too much stress cannot be laid on the importance of an early diagnosis in spasmophilia, or the necessity of bearing in mind the underlying latent condition after the baby has passed through a siege of convulsions.

The action of phosphorus, combined with cod-liver oil, has been found the world over to be almost specific. One-half of a minim of a freshly prepared oil of phosphorus, the equivalent of a 1/200 grain of phosphorus, added to a dram of cod liver oil, given two or three times a day, produces remarkable results, in latent tetany, within a few weeks. The phosphorated oil should not be more than a few weeks old. Phosphates are worthless. Finkelstein believes that phosphorus is an anti-spasmodic, but he did not find it a specific cure in all cases. Schabad¹⁹ and also Guest,¹¹ attribute the good effects of phosphorized cod liver oil in spasmophilic and rachitic infants to its effect on the metabolic processes in increasing calcium retention. Cod liver oil, alone, is of doubtful value.

Within the last few years, calcium preparations have been highly recommended; calcium lactate, calcium chloride, and calcium acetate have been tried with good results. The beneficial effect of calcium preparations on nervous irritability, has been generally recognized. Calcium lactate in 2-grain doses, three times daily is probably the most suitable preparation, as it is the least irritating to the infant's stomach.

The chloride is believed by many to be more efficient in its

sedative action, than the other preparations, but the gastric distress which it produces cannot be neglected. Sedgwick,²⁰ after exhaustive clinical investigations, concludes that in acute and subacute cases under one year with high electrical reactions, the results with calcium chloride are brilliant. In more chronic and serious cases, calcium is of definite value. The chloride is given in the same dosage as the lactate—2 grains, three times daily. Most observers agree that the calcium preparations are too irritating to be used subcutaneously.

L. F. Meyer²¹ advocates the use of the bromide of calcium for its double sedative effect. He finds it of special value in laryngospasm.

Meltzer and Auer²² have shown that magnesium salts injected into the circulation of an animal, have a depressing effect on the motor and sensory areas. On the basis of their investigations, and also the similarity in action between magnesium and calcium, Behrend,²³ in 1913, injected magnesium sulphate subcutaneously into infants to alleviate the convulsions of spasmophilia. Twenty c.c. of an 8 percent solution were given without toxic effects and all of his cases were improved. He found that his treatment influenced the electrical reactions most quickly, laryngospasm was least affected, but nevertheless, more quickly than by any other treatment. If increased electrical reactions alone are present, without any manifest spasms, Behrend advises the use of phosphorized cod liver oil rather than the magnesium injections. In treating an acute case, give the child an immediate injection of magnesium sulphate, then empty the bowels, and then after a six- or twelve-hour fast, feed a salt-free gruel. After two hours, if there is no improvement, another injection of magnesium sulphate is given. When active manifest symptoms are no longer present, except possibly laryngospasm, stop the injection and give the phosphorus and cod liver oil.

I have seen brilliant results after the injection of 10 c.c. of an 8 percent solution in several severe cases on Dr. Abt's service in the Sarah Morris Hospital. The only objection is the painful effect on the buttocks after the injection, but the pain is of short duration, seldom more than an hour.

In the treatment of convulsions, the first indication is to allay the spasm. As a rule, when the doctor arrives on the scene, the child has had his warm bath, and enema, the convulsions have abated and the child lies quietly, with cold cloths to his forehead. At times, however, active measures are called for; a subcutaneous injection of the magnesium sulphate, chloral by mouth if possible in one or two grain doses, combined with 2 to 5 grains of calcium bromide, repeated at intervals of 2 or 3 hours. If the child cannot swallow, as is usually the case, twice this dose should be given per rectum. Occasionally it may be necessary to repeat the magnesium sulphate,

or to give a hypodermic injection of 1/100 to 1/50 grain of morphine or inhalations of chloroform to relax the spasm. The writer has seen the tetany and eclamptic seizures so severe that the bones of the extremities were fractured. In case of severe laryngeal spasm, it may be necessary to pull out the tongue, or immerse the child into cold water and in extreme conditions, to perform even an emergency tracheotomy. When the spasm have relaxed, it may be necessary to give a second rectal flushing.

For twelve hours after the convulsion the child should have only water or weak tea sweetened with saccharin, and without milk. Salt solution either by mouth or rectum is absolutely to be avoided. After the period of starvation, breast milk should be started in small amounts. If breast milk cannot be secured, a cereal concoction of rice, barley or oatmeal should be given without the addition of salt. After another twelve hours the protein milk of Finkelstein or a solution of milk curd in water or in cereal water may be administered. Calcium lactate combined with calcium bromide should be prescribed as soon as the child can swallow. Phosphorized oil should be given as soon as the stomach will tolerate it. The bromide can be stopped when the laryngeal stridor disappears; the lactate and oil should be continued until the electrical reactions are normal and the active rachitic symptoms have disappeared. On the 4th or 5th day a few ounces of diluted cow's milk may be tried and the effect awaited. A general mixed diet—cereals, mashed vegetables, orange juice, cooked fruits, and soups—should be instituted as soon as possible, and the amount of cow's milk should be reduced to the minimum until all signs of nerve irritability have disappeared.

¹ Ibrahim (Frau Feer's Lehrb. d. Kinderheilkunde, 1911, p. 459).

² Kassowitz (Wien. med. Wchnschr., 1893).

³ Thiemish (Jahrb. f. Kinderh., LI, 1900; Deutsch. med. Wchnschr., Vol. VII, 1913).

⁴ Gerstenberger (Cleveland Med. Jour., Nov., 1909).

⁵ Finkelstein (Lehrb. der Saeuglingsk., I).

⁶ Rosenstern (Jahrb. f. Kinderh., LXII, 1912, p. 154).

⁷ Grulee (Arch. Ped., 1912, XXIX, p. 24; Amer. Jour. Dis. Child., 1913, V, p. 205).

⁸ Stoelzner (Jahrb. f. Kinderh., LXIII, 1906, p. 661; Neurol. Centralbl., XXVII, 1908, p. 58).

⁹ Cybulski (Monatsch. f. Kinderh., V, 1906, p. 409).

¹⁰ Schwartz and Bass (Amer. Jour. Dis. Child., III, 1912, p. 15).

¹¹ Guest (Wien. med. Wchnschr., 1906; Monatschr. f. Kinderh., 1911, p. 7).

¹² Aschenheim (Monatsch. f. Kinderh., IX, 1910 (original), p. 466).

¹³ Sylvestrie (Deutsch. med. Wchnschr., 1906).

¹⁴ Leopold and von Reus (Wien. klin. Wchnschr., XXXV, 1908).

¹⁵ Loeb: Oppenheimer's Handbuch der Biochemie.

¹⁶ MacCallum and Voegtlin (Jour. Exper. Med., XI, 1909, p. 118).

¹⁷ Lust (Deutsch. med. Wchnschr., XXXIX, 1913, p. 1,087; Muenchen. med. Wchnschr., VI, 1913, p. 93).

¹⁸ Brown and Fletcher (Amer. Jour. Dis. Child., X, 1915, p. 313).

¹⁹ Schabad (Arch. f. Kinderh., LII).

²⁰ Sedgwick (Lancet Clinic, CXVI, 1916, p. 121).

²¹ Meyer, S. F. (Jahrb. f. Kinderh., LXXIV, p. 560).

²² Meltzer and Auer (Handbuch d. Biochemie, II, p. 104).

²³ Behrend (Monatsch. f. Kinderh., XII, 1914, p. 269).

A CASE OF MOTOR APHASIA, AND A CASE OF CAUDA EQUINA DISEASE, WITH REMARKS ON TOPICAL DIAGNOSIS.*

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Notwithstanding the many disappointments encountered in the management of organic nervous diseases, yet there is scarcely a field of clinical medicine which offers so much of interest and fascination from a diagnostic standpoint.

While it is true that there remain certain fields of the cerebral cortex, and certain basal ganglia whose functions are yet unknown, nevertheless the knowledge gained by the study of comparative anatomy and physiology, experimental pathology, clinical surgery, and the clinicopathologic study of neurologic cases is rapidly reducing the extent of these unexplored regions.

It is to be hoped that a slight recompense for the unspeakable horrors of the present world tragedy may be a considerable advancement of our knowledge in this domain.

The chief points of clinical interest in a neurologic study are the topical diagnosis of the lesion and the pathologic nature of the same.

When the clinical picture is completely developed and the lesion lies within the sensomotor area of the cortex or the metameric segments of the cord, it is usually possible to determine with reasonable certainty the limits of their involvement.

From a prognostic and therapeutic standpoint the nature of the lesion is of scarcely less importance than its location, and here the evidences of past or present infections, of toxic or metabolic conditions, of vascular disease, of trauma, and of tumor growths must be accorded due consideration.

The diagnosis of the nature of a tumor when present is scarcely more than a clever guess based on the law of average.

In order the better to bring out some of these points I am about to epitomize the history of two rather interesting cases which are at present under my care.

A CASE OF MOTOR APHASIA.

Mrs. B. Aet. 50. Family history unimportant. She is the mother of five daughters, all of whom have prominent eyes and one has had exophthalmic goitre. The husband died of pneumonia at 70. Previous health good.

At about thirty years of age the patient developed a goitre with pronounced

*Read before the Marion County Medical Society, January, 1918.

nervous symptoms, palpitation of the heart, and periods of marked fluctuation in weight.

Under electrical treatment for the goitre and the rest cure she improved, and in recent years she has noticed no evidence of palpitation.

She has been a poor sleeper, awaking especially early in the mornings.

She has always been quick of speech and action but not emotionally irritable.

About ten years ago she was suddenly seized with pain in the right eyeball which resulted within a few days in blindness.

The vision of the other eye has remained good.

She complains of some pain at times in the back and about the waist line, and often of pain in the right arm.

There has been no other serious illness.

Present Complaint.—This began about four years ago when she was suddenly seized, while walking across the floor, with pain and weakness in the right side of the body and complete loss of speech.

She did not fall or lose consciousness, and recovered her speech after about four hours and within a week or so felt quite well again.

She had similar spells again in September and December, 1915, and April, 1916, the latter following the sudden death of her husband.

In each of these she recovered the speech gradually after a few days.

In December, 1916, she made a trip of about a hundred miles to Sioux City and while shopping was seized with a similar attack which lasted for several days with considerable mental confusion and loss of speech, from the latter of which she has never recovered.

Between these spells her speech and mentality have been normal and even at the present time she manages the details of a considerable business as well as a rather complicated household.

Her family feel that these attacks have always followed a period of unusual physical or mental strain.

Physical Examination.—She is fairly well nourished, walks briskly and without ataxia, and stands well with the eyes closed. The left pupil responds to light, the right does not. The facial lines are a little more marked on the right than the left, and the muscles of expression, under the emotional disturbances in attempts at voluntary speech, show choreiform movements with blepharospasm about the right eye. The motility of the eyeballs is normal in all directions, but the upper lid lags in descent and the lid slit widens on attempts at focussing.

There is no paralysis of the cranial nerves, but associated with the facial grimaces in the attempts at speech, there are choreiform movements of the tongue and clonic contractures of the right trapezius and sternomastoid, and pronation and supination of the right forearm.

The special senses are intact and there is no disturbance of sensibility nor any points of tenderness.

The right lobe of the thyroid is slightly enlarged and harder than normal.

The right arm is adducted and the forearm slightly flexed, but there is no spasticity; the arm cannot be extended above the head so far as can the left. The reflexes in the right arm and leg are exaggerated.

She understands everything spoken to her, can read silently but not aloud, can write her name and address, but practically nothing from dictation.

Voluntary speech, which she rarely attempts, except in answer to questions, is syllabic and staccato and associated with the above described choreiform movements of the right side of the face, neck, shoulder, and forearm.

Immediately on the pronouncing of the proper word there is an expiratory sigh and muscular relaxation.

Not infrequently after many vain attempts to secure the proper word, she

speaks out in a perfectly natural voice, "I can't say it," and the muscular spasm is at once relieved.

She can repeat from memory, in a syllabic way, numbers, days of the week, short poems, the Lord's Prayer, the twenty-third Psalm, often requiring assistance in the beginning of a new series, and, if interrupted, in its course must frequently return to the beginning to complete it.

Occasionally when repeating from memory and beginning a new sentence, she repeats some word of the previous sentence, usually the last, instead of the initial word of the new sentence, but at once recognizes her mistake.

When asked to repeat a series, as 5, 10, 15, the operator at the same time indicating these on her fingers, we were surprised to note that they were spoken with much more alacrity when indicated on the fingers of the left hand than on the right. Words or sentences spelled or spoken are repeated perfectly naturally.

She cannot name the colors even with the object before her, nor speak in contrasts even when one of the series is given, as, up, down, right left, but recognizes at once when the wrong word is given, though unable to correct it.

She is able to memorize short poems, the vocals and consonants, and repeat them from memory in a scanning manner.

It is only with the greatest effort and often after persisting for ten or fifteen minutes that she is able to name the menu served on her tray. She can sing, carrying the words and tune from memory.

She can write from copy but not from dictation. She evinces the usual interest in a story, and appreciates the beauties of poetry of which she is very fond, and her judgment on matters of business is quite remarkable.

The heart, lungs, and abdominal organs are normal, the systolic blood pressure 150 and diastolic 90, there is a trace of albumen in the urine which disappears on rest in bed, the blood findings normal and the serum Wassermann negative.

Six weeks in bed under special nurse's care with suggestive and reeducational methods of treatment, and potassium iodide and sodium cacodylate, showed some improvement in the general nutrition and spirits of the patient, but no benefit to the aphasia.

CLINICAL SUMMARY.

A woman of good family history who developed symptoms of exophthalmic goitre at about thirty years of age, sudden painful loss of vision with resulting cloudy vitreous at forty, and repeated rather mild attacks of right sided paraplegia with transitory aphasia of the motor type, and who now, for more than a year, has had permanent incomplete aphasia of the motor type, with slight evidence of involvement of the upper motor neurones controlling the right side of the body, but with no evidence of spasticity, but with choreiform movements of the muscles of the right side of the face and right upper extremity, associated with the painfully labored attempts at spontaneous speech, and a remarkable difference of serial speech, when the series are indicated respectively on the fingers of the right and left hands, and perseveration, or the tendency to repeat the last word of a previously spoken sentence when attempting a new one.

The topical diagnosis is a circumscribed cortical or subcortical lesion involving only the motor speech center, the destruction of

which is probably not complete and is certainly primarily vascular, but possibly now also of a cystic degenerative character.

The choreiform movements of the muscles of the right side of the face and upper extremities, during attempts at voluntary speech are to be explained as the result of radiating impulses to adjacent cortical areas from over innervation of the motor speech center.

The albuminuria and the evidences of vascular degeneration, as indicated by the blood pressure and the old hemorrhagic retinitis, are undoubtedly the result of a prolonged thyreotoxic state.

A CASE OF CAUDA EQUINA DISEASE.

E. S., 27 years of age. Mother has been insane since about forty; family history otherwise unimportant.

He is married and has four children all of whom are well. He consulted me for pain in the right lower quadrant of the abdomen, associated with frequent urination during the day and nocturnal enuresis which he says has persisted since childhood. He is also constipated and has been so for years. About eight months ago he noticed slight bloody urine for a day or two and at one time had a severe chill.

During the past summer he has had some pain along the outer portion of the thigh and leg which was aggravated by coughing and sneezing and which a doctor had treated for sciatica.

He has always worked hard at any farmwork to be done. He is well nourished and looks perfectly well.

There is a history of injury to the back in a football scrimmage when about ten years of age and which confined him to bed for about three weeks. The history of this injury was quite vague in the patient's mind and was only obtained later from members of his family. Physical examination, including the usual neurological tests and the knee jerks, gave negative results except that there was a tender elastic movable tumor about the size of a large coconut in the right iliac and inguinal region, which the patient thinks goes down when the bowels are moved freely.

An elongated nodular mass could be felt extending over the brim of the pelvis into the left iliac fossa.

A voided specimen of urine of about an ounce was of neutral reaction and showed considerable albumen and pus.

Catheterization of the bladder showed thirteen ounces of residual urine, whereupon the tumor mass disappeared. The x-ray showed no stone in the bladder or kidney. There was no ataxia, the upper and lower abdominal, the cremasteric, and the patellar reflexes were all present and equal on both sides.

The patient entered the hospital, where bladder irrigations were carried out, and a complete neurological examination was made.

There was not the slightest evidence of paralysis or spasticity of the lower extremities, nor of sensory disturbance. The reflexes were all present except the right Achilles and the sphincter anal.

There was an elliptical area about two by three inches over the extreme lower sacral and coccygeal region which was hypalgesic. In voluntary urination there was a slow dribbling and an absence of rhythmic contractions of the bulb at the completion of the act. It was impossible to completely empty the bladder voluntarily, and an absence of bladder tonus was noted on irrigation.

Inquiry disclosed that there was an absence of contraction of the urethral bulb during seminal ejaculation.

Erection, orgasm, and libido were apparently normal.

A brisk cathartic cleared the sigmoid of the nodular mass that had been noted arising out of the pelvis.

A reexamination of the x-ray plate showed a slight disfiguration of the right articular process of the fourth lumbar vertebra, with some distortion of the body.

This led to a diagnosis of traumatic injury of the cauda equina, in differentiation of a possible limited conus lesion.

CLINICAL SUMMARY.

Until the history of the injury was secured in this case I was much perplexed to explain the atonic condition of the bladder, and, indeed, without a most complete neurological examination the very limited extent of the injury to the nervous system would have been overlooked.

The recent history with the presence of an elastic mass in the right iliac region together with the pyuria and pain down the leg suggested at once the possibility of a displaced hydro- or pyonephrotic kidney.

When the mass disappeared on removal of the residual urine, one might still think of an immense diverticulum of the bladder, and, indeed, this was given serious consideration, when the usual office examination of the nervous system failed to reveal any neurologic basis for the condition.

The neurologic features of special importance were, on the sensory side, a painful irritation along the sciatic nerve, a want of sensation of fullness of the bladder and rectum, and a small caudal area of hypalgesia.

On the motor side a paralysis of the external sphincter of the bladder and anus, and the ischiocavernosus and bulbocavernosus, all voluntary muscles.

This led to the loss of control of the bladder and rectum, and the absence of bulbar contractions in urination and ejaculation.

On the reflex side there was evidence of some injury of the reflex arch extending from the fifth lumbar to the coccygeal, but not to the extent of complete paralysis.

The Achilles reflex lies in the fifth lumbar to the second sacral segments, the ejaculatory center in the second and third sacral segments, and the bladder, rectal, and anal reflexes in the third, fourth, and fifth sacral and the coccygeal segments of the medullary cone. All of these centers were evidently injured or their afferent or efferent nerves destroyed. The erection center in the third sacral segment was miraculously preserved and there was consequently no impotency.

This center may be excited by three different nervous influences. First, the psychogenic influences emanating from the brain and descending the cord which is the well-beaten path of the libertine.

Second, the autonomic (sympathetic) influences coming from the vesiculae seminales. Such influences are observed in the erections of continence. The third is mediated by sensory nerves which convey impulses from the external genitalia. There is no evidence that any of these paths were disturbed.

There are two phases of ejaculation, the first of which is due to the contraction of the involuntary muscular tissue in the seminal vesicles and results in the compression of their contents into the urethra, and is produced by influences emanating from the ejaculatory center through the medium of the autonomic nerves. This was preserved in our case.

The second phase is mediated by the motor branches of the lower sacral nerves, which supply the bulbo- and ischiocavernosus muscles and effects the jet-like ejaculation of the urethral contents. This function is destroyed.

The practical impossibility of a conus lesion which would involve some of these centers and spare others lying in the same segment of the cone, together with the x-ray evidence of injury of the fourth lumbar vertebra which is considerably below the termination of the cord, leaves no doubt of a cauda instead of a conus lesion, a differentiation which is sometimes impossible.

The sciatic pain is undoubtedly due to irritation of the fourth lumbar root where it makes its exit from the neural canal and enters into the formation of the plexus which forms this nerve.

HAS EVERY HOSPITAL AN INHERENT RIGHT TO AN INTERN?

Misunderstandings by Hospitals in Regard to Internship—No Discredit Attached to Non-Approval for Intern Education—Duties Which the Hospital Owes the Intern.

BY JOHN M. BALDY, M.D.,

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There are so many misunderstandings by hospitals in regard to the question of internship and their so-called rights in this matter that it has been thought worth while to discuss a few points relative thereto.

As a basis for a discussion it may be said that no hospital has an inherent right in the matter of internship any more than it has an inherent right to a superintendent, to a head nurse of its training school, to an engineer, or to a cook. Hospitals have the right to purchase the services of any one of the above-mentioned employees. They have the right to purchase the services of an intern. In the case of the above-mentioned employees, if hospitals wish to secure an individual competent to fulfill the needs of that particular department, they must pay the price. It goes without saying that, if they need the services of an intern, they must pay the price. The usual price asked of a hospital for the service of an intern is his education, and consequently it follows as a corollary that any hospital that wishes to buy the service of an intern must be able to qualify on the possible educational points necessary for this purpose. In Pennsylvania the Commonwealth has laid down a very definite and positive standard, both as to equipment and as to educational advantages, to be offered in return for the service of an intern. It is therefore simply a question as to whether or not a hospital can pay the price, as to whether it has a right to an intern. There is no such thing as an inherent right, an assumption which is too often assumed by hospitals.

There is no great hardship to any hospital not being approved for intern teaching, even if it desires a resident physician on its service. There are a number of possibilities of fulfilling this need. The number of interns who are required to take a service in an approved hospital are only a portion of the total number graduated from the Pennsylvania schools in any given year. In addition to these there are a few graduated from schools outside of Pennsyl-

vania who intend to take the Pennsylvania state examinations and practice medicine in Pennsylvania. The total number of these compared with the total number of students graduated in the country at large is probably not more than 10 percent or 15 percent, and hospitals not on the approved list have available for their services the other 85 or 90 percent of young medical graduates of the country. Furthermore, they have available for their services young men who have already spent a year of internship in an approved hospital and who are about ready to start the practice of medicine. Probably 50 percent of the graduates in medicine are boys of moderate means who have exhausted all of their available funds during the course of their education and who would be only too glad to accept the position of "hospital resident" for a year or two at a decent living salary, thus making it possible for them to extend their hospital experience, as well as to lay up a few dollars with which to assure themselves their first year's expenses when they start in to practice. This establishment of the salaried resident physician is peculiarly adaptable for hospitals not assuming the teaching function. From these sources any unapproved institution may draw, and in no way interfere with the ambition of the Commonwealth to secure for its coming practitioners the proper standard of practical education before they are allowed a free hand upon the community.

It is a grave question whether or not small institutions obtain any advantage from the service of an intern. Usually hospitals of from twenty-five to fifty beds are in small communities where the doctors of the medical and surgical staff are in close touch with the institution at all times; a phone leads directly to the office and bedroom of every member of the staff, with every member within such easy reach as to be able to be in the hospital as often as required. The almost usual routine of such a hospital, where an intern is employed, is that the intern is practically allowed to run the institution; as a matter of fact, he is there more for the convenience of the doctors than he is for the efficient working of the hospital. The salaried resident physician accomplishes the same result as does the intern and has the great advantage of allowing the institution to demand competency and the full time of the doctor for the service of the hospital. In a large number of these institutions the intern is allowed entirely too much freedom for the interest of the patients, and he receives little or no instruction from the medical and surgical staff.

Some of the most efficient medical and surgical institutions in the state have been in the past years, and are at present, conducted without the service of any intern, and so efficiently is the service conducted by the closer personal attention of the medical and surgical staff that an intern would be considered a nuisance and in the

way. Many such institutions seriously and rightly object to allowing a young man too much freedom in the treatment of patients.

No discredit whatever attends any medical institution which is not approved for intern education. The reason dominating the desire of not a few hospitals for approval for the education of an intern is the fear that their non-approval means discredit. If one were going to give a contract for shovels and pickaxes, and sent his agent into the field to seek out and recommend to him such factories as could fulfill his demands, and this agent happened to go, among others, into the Carnegie mills, which were producing Bessemer armor plate for the navy, and, in rendering his report of available steel manufacturing plants to his employer for the purchase of pickaxes and shovels, failed to include the Carnegie mills, it could hardly be complained by the Carnegie plants that they were not included in the list so reported and approved, and that thereby they were discredited as a steel plant. It would simply mean that the Carnegie plants were not producing picks and shovels, and there would not be the thought in the mind of a single individual in the Commonwealth that the Carnegie plant was not producing competently that for which they were organized—namely, the production of armor plate. And so it is with hospitals. The Commonwealth is not seeking for armor-plate hospitals. It is seeking for and approving hospitals which have all the facilities, both physical and personnel, for the education of the intern on a certain standard; its approval simply means that such an institution fulfills that need, nothing more and nothing less.

Institutions have sought approval for intern education because of the fact that they have conceived that it may in some mysterious way interfere with their state appropriations. This again is a fallacy. The Commonwealth, in contributing money to medical institutions, is doing so on the basis of the charity work done by the institution for the citizens of this Commonwealth. That service is evaluated, not by the Bureau of Medical Education and Licensure, but by another bureau, the State Board of Charities, and the approval or disapproval of the Bureau of Medical Education and Licensure for intern education has no bearing whatever on the approval of the State Board of Charities for the amount of charity work done; and no institution is in any way affected as far as its charitable financial work is concerned. As a matter of fact, if a weak institution which has become fairly competent in the carrying out of the one function which it was fulfilling were to take on the dual function (the additional function of education of the intern), it might readily become so inefficient in the conduct of its purely charity work as to weaken its claims on charitable funds for charity work performed.

It would be a grave mistake on the part of the state to demand that all hospitals accept interns into their service, especially after having laid down a certain standard as a minimum competent standard for instruction of the intern. Hospitals are usually established by their founders for the fulfillment of certain specific functions. A certain need has grown up in a given community. Influential members of the community have supplied the funds and the energies sufficient to develop an institution for that particular need. They have developed this institution after years of hard struggle to a point of efficiency. They are perfectly satisfied with what they have accomplished; the need as seen by them is wholly fulfilled and the possible funds available are fully absorbed. For the Commonwealth to step in and say that such an institution shall now assume a second function, an educational function, one requiring vast changes in equipment and personnel of the staff, would so absorb the available funds and energies of the institution as to cripple it in its effort to carry on two functions and would make the carrying out of both of them inefficient. Such compulsion would force the institution in only too many instances to degenerate from one of great efficiency to one of utter inefficiency on account of the lack of interest by those in management (something having been forced upon them in which they had little or no interest), as well as on account of the division of funds which were only sufficient for carrying out the one object. In the Commonwealth of Pennsylvania no such mistaken idea is held by the state. The administrative body fully realizes the situation and believes that in the case of large numbers of hospitals not only would it be foolish for them to attempt to qualify for approval for the intern education, but it would be fatal to their interests. It is in no way necessary for any hospital so disinclined to depart from its past methods of giving service to the sick of their community; nor will it at any time be necessary so to do. There is quite a sufficient number of hospitals in the Commonwealth which are able and willing, by minor changes in administration and equipment, both of which they can well afford and the doing of which will bring no hardship to the institution, to absorb all of the available material for internship. As a matter of fact, there are too many such institutions. The number of graduates of medical colleges are today 33 percent less than they were ten years ago. Pennsylvania has an ever-increasing number of hospitals. Consequently, the available material for internship is becoming proportionately scarcer and scarcer. Not only is this so, but large numbers of hospitals which in the past have been small, or for some reason or another have not desired the use of an intern, are now expanding and are helping to absorb the available number of young medical men for this service. The consequence of these multiple forces is that, if it were admitted for a moment that every

hospital had an inherent right to an intern, there would not be the possibility of parceling out a man to each institution.

A clearer understanding of the situation will probably be obtained by a frank discussion of the whole subject; and that is what is being attempted. It is primarily the intention of the Commonwealth to secure for the intern the best possible education. From this viewpoint its interest in the hospital is purely secondary. This is not a matter in which the interest of the intern is alone considered. If it were, the Commonwealth would have no function in the matter, as it is not concerned in class legislation. The interest the state has taken in the matter is the interest of the whole people of the Commonwealth; that each and every individual, however poor he may be, shall be assured when in the future he employs a physician that he and his family shall receive a competent service. Without the stamp of approval of the state, the citizens have no assurance of the competency of the service offered them. The effort is that the state approval shall stand as a stamp of efficiency; a minimum standard, of course, but a safe one withal. Consequently, it is perfectly proper that the Commonwealth shall say that the intern education shall consist of a certain definite line of instruction given in institutions which have definite physical and educational qualifications by means of which the standardized instruction may be given. The Commonwealth, therefore, having laid down the physical qualifications and the line of instruction, must recognize any institution within its borders which can fairly show that it is able to and does live up to the appointed standard. But the natural corollary of this is that no institution which does not furnish the standard which is demanded, both of equipment and of service of their staff, can expect to be considered in the matter. It must, therefore, be realized that the state can have no active interest in furnishing every hospital with an intern; the fulfilling of that need, if the need exists, is peculiarly one which concerns the hospital itself, just as does the supplying itself with any other employee.

It may be truly said that the furnishing of the physical equipment, as compared with the insurance of competent instruction, is by far the easier of the two propositions. Many an institution which is physically equipped, according to the state standard, is utterly inefficient in its teaching capacity on account of the lack of proper or competent service of its medical and surgical staff. Any institution of seventy-five beds may be perfectly competent to conduct proper and comprehensive intern teaching, but a medical and surgical staff of a hospital comprising a thousand beds may utterly disqualify that institution as competent, both on account of the organization of the various services and on account of the lack of ability or willingness of the members of the medical and sur-

gical staff themselves to take the trouble to do that which is necessary in order to bring about a systematic and proper course of instruction. The service of one or two excellent members of a staff may be totally outweighed by the indifference or incompetence of others.

Following this thought and reverting to the state's interest in any hospital, it goes without saying that the hospital which is compelled to be so organized as to teach the intern satisfactorily is giving a maximum assurance to the community that it is offering a proper service to its patients; and the corollary to this is true, that the medical and surgical staff which is so slovenly and so careless in its duties to the intern as not to give a satisfactory service is also equally slovenly and careless in its handling of the patients.

It has been complained by hospitals that they need the services of an intern; that they have seventy-five or one hundred beds and the hospital *needs* an intern. They would like to have one or possibly two interns. This usually is the sum total in such an institution of the conception of its duties to the intern. The mere suggestion of such a proposition carries with it the knowledge that the intern in an institution of that type would not receive a proper service from the educational standpoint. What that hospital wants is an employee to do its work. What that hospital should do is to pay, in dollars and cents, the full value of the service of such an employee by obtaining a resident physician and then demanding his full time for its own services; and not to attempt to give half of the time of the hospital and of the hospital staff to the instruction of the intern. This is the remedy at the service of any hospital which feels that it needs the service of a physician residing in the institution, and which is unable to secure interns on the merit of the service rendered and the educational advantages offered. Many hospitals imagine they are offering a fine opportunity because of the wealth of material passing through their wards, and many interns are deceived by the same token. The state conceives differently and considers the personnel and efforts of the staff far and away of the greater importance. Consequently, any hospital that cannot or does not control its staff in these matters cannot be considered as having a satisfactory service to offer in return for approval for intern teaching.

The whole question of internship and what it means has so often been misconceived that it may be of aid to hospitals to have the matter put fairly and properly before them—hence this discussion. It has been thought because of the fact, in the instance of a number of institutions whose managers have discussed the matter with members of the Bureau of Medical Education and Licensure, that the results to those interested in the institutions have been so eminently satisfactory on account of the proper viewpoint having been put

to them that the discussion might be helpful to others. Quite a number of institutions eager for approval for internship, when the matter has been put before them in the above form, have wisely given up the effort to qualify and have appeared grateful for advice which has relieved them of much embarrassment, with the additional result of reorganization in points of management which has brought to their community a vastly more efficient medical and surgical service than had before obtained.

It may be said, with little fear of contradiction, that the greatest trouble with hospitals has been the lack of proper sources from which managers could derive adequate advice in regard to their various functions. The Bureau of Medical Education and Licensure stands ready at any time to assist any board of managers in regard to these matters.

SPECIFIC INFECTIOUS DISEASES OF UNKNOWN ETIOLOGY, WITH SPECIAL REFERENCE TO ULTRAVISIBLE VIRUSES.*

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The theory of *contagium animatum* originated long before the invention of the microscope. The development of the microscope, culture methods, staining reactions, animal experimentation, and serum tests has led to the demonstration of the specific causative organisms involved in many of the diseases of men and animals. From the study of the microscopical forms present in many pathogenic processes has been evolved the new science of bacteriology, or microbiology. The science of microbiology, which at first was confined to the study of pathogenic organisms and fermentation processes, now includes the vast expanse in which are involved the investigation, correlation, and teaching of facts relating to dairy, soil, and household bacteriology, pathology, hygiene, sanitation, and preventive medicine.

In the excellent words of Rettger,¹ "Bacteriology is a child of many adoptions, ever precocious, but not yet fully mature. Born with a definite mission to serve and to save, it has recreated pathology, given inspiration and new life to botany and zoology, contributed generously of its substance to agriculture and home economics, and built itself as the framework around which modern hygiene and preventive medicine have been built."

We are inclined to regard the study of pathogenic microorganisms as fairly well completed and the science of bacteriology as quite conclusively established in so far as it relates to the study of specific infectious diseases. A most conspicuous break, however, has occurred in the development of the study of microbiology, which relates to a group of specific infectious diseases of unknown etiology consisting of nearly forty diseases. This break has been bridged over, in some degree, by the results of the work of many investigators, who have demonstrated that the majority of diseases of this group are capable of being produced by the filtrate of diseased tissues.

Loeffler and Frosch² in 1898 first noted the phenomenon of virus filtration in connection with the study of the virus of foot-and-mouth disease. They found that the serum from infected cattle, after being passed through fine porcelain filters which would not allow

*Read before Wayne County Medical Society, Detroit, May 13, 1918.

the passage of ordinary bacteria, still retained the specific living agents which act as the cause of the disease.

It is interesting to note the manner in which this discovery was made. Loeffler³ conceived the idea that, by passing the exudate from the vesicular lesions of foot-and-mouth disease through the Berkefeld filter, the more active, infective portions of the virus might be retained by the filter, thus rendering the filtrate free from infective properties, but, at the same time, capable of producing protection against the disease when injected into healthy animals. Control experiments proved that no known bacteria could pass through the filters which were employed, and therefore it was concluded that the virus of foot-and-mouth disease consists of some living agent capable of passing through the fine pores of bacteria-proof filters.

That the filtrable material is not a strong toxic chemical substance, but does represent virulent living infection in some form, can be shown by transmission of the virus through several generations of the host, and by the addition of germicidal agents to the filtered virus.

In the former experiment a small portion of the filtered virus is injected into a healthy animal. From this animal, after the appearance of symptoms, the virus is collected and filtered, and with it a second animal is inoculated. When carried through a successive series of animals, it becomes impossible to estimate the dilution of the original material, and hence it must be concluded that the virus is not an inert toxic chemical substance. The addition of germicidal solutions renders the virus powerless to produce disease.

Since the pioneer work by Loeffler and Frosch, many investigators have contributed to the study of ultravisible viruses. The results of this work have demonstrated that there are nearly forty specific diseases which belong to this group as shown in the following table:

LIST OF SPECIFIC INFECTIOUS DISEASES OF MAN AND ANIMALS, THE CAUSATIVE FACTORS OF WHICH ARE CLASSIFIED AS FILTRABLE AND ULTRAVISIBLE VIRUSES.

NAME OF DISEASE.	ORIGINAL INVESTIGATOR.	YEAR
1. Foot-and-mouth disease.....	² Loeffler and Frosch.....	1898
2. Mosaic disease of tobacco.....	⁴ Beijerinck	1899
3. Pleuropneumonia of cattle.....	⁵ Nocard and Rous.....	1899
4. African horse sickness.....	⁶ MacFadyean	1899
5. Foul pest.....	⁷ Centanni and Savoruzzi.....	1901
6. Yellow fever.....	⁸ Reed and Carrol.....	1901
7. Fowl diphtheria.....	⁹ Marx and Sticker.....	1902
8. Chickenpox	¹⁰ Juliusberg	1902
9. Pigeonpox	¹⁰ Juliusberg	1902
10. Sheeppox	¹¹ Borrel	1902
11. Cattle plague.....	¹² Nicolle and Adil-Bey.....	1902
12. Rabies	¹³ Remlinger	1903

NAME OF DISEASE.	ORIGINAL INVESTIGATOR.	YEAR
13. Hog cholera.....	¹⁴ Dorset, Bolton, and McBryde.....	1904
14. Infectious agalactia of sheep.....	¹⁵ Celli and DeBlasi.....	1904
15. Catarrhal fever of sheep.....	¹⁶ Robertson and Theiler.....	1904
16. Molluscum contagiosum.....	¹⁷ Juliusberg.....	1904
17. Cowpox.....	¹⁸ Celli and DeBlasi, ¹⁹ Remlinger.....	1904
18. Dengue fever.....	²⁰ Ashburn and Craig.....	1906
19. Infectious stomatitis papulosa of cattle.....	²² Ostertag and Bugge.....	
20. Pappatica fever.....	²³ Doerr.....	1908
21. Smallpox.....	²¹ Casagrandi.....	1906
22. Infectious equine anemia.....	²⁴ Carre and Vallie.....	1908
23. Leukemia of fowls.....	²⁵ Ellerman and Bang.....	1908
24. Trachoma.....	²⁶ Bartarelli and Ceccehtto.....	1908
25. Poliomyelitis.....	²⁷ Lentz, ²⁸ Landsteiner and Levaditi, ²⁹ Flexner and Lewis.....	1908
26. Guinea pig epizootic.....	³⁰ Petrie and O'Brien.....	1909
27. Milkpox.....	³¹ Ribas.....	1909
28. Guinea pig paralysis.....	³² Romer.....	1909
29. Measles.....	³³ Goldberger and Anderson.....	1911
30. Scarlet fever.....	³⁴ Bernhardt, ³⁵ Cantacuzene.....	1911
31. Flood fever.....	³⁶ Miyajima.....	1911
32. Rat disease.....	³⁷ Novy and Perkins.....	1911
33. Chicken sarcoma.....	³⁸ Rous and Murphy.....	1911
34. Typhus fever.....	³⁹ Nicolle, Conner, and Conseil.....	1912
35. Silk worm jaundice.....	⁴⁰ Prowazek.....	1912
36. Osetochondrosarcoma.....	⁴¹ Rous, Murphy, and Tytler.....	1912
37. Guinea pig plague.....	⁴² DeGaspari and Sangiorgi.....	1913
38. Mumps.....	⁴³ Granata (1908), ⁴⁴ Gordon.....	1914

GENERAL CHARACTERS OF ULTRAVISIBLE VIRUSES.

The infective agents comprising this group are characterized by the following fairly constant features:

1. Great infectiousness.
2. Production of active immunity.
3. Invisibility.
4. Filtrability.
5. Noncultivability.
6. Wide geographical distribution.

Infectious Character.—Perhaps the most constant character which distinguishes these viruses, as a group, relates to their marked pathogenicity. They are disseminated with ease and rapidity. Their pathogenic power persists in relatively high dilutions.

The marked infectiousness of these viruses is well illustrated by that of foot-and-mouth disease, the control of which has cost this country several millions of dollars. An outbreak of foot-and-mouth disease presents most serious difficulties to our Department of Agriculture, not because of any unusual high mortality attending the disease, but because of the lightning-like rapidity with which

the infection spreads, not only from one community to another, but also from one locality to another far distant.

Invisibility and Noncultivability.—The characterizations of invisibility and incultivability are relative and temporary. One notable and most interesting exception is the virus of pleuropneumonia of cattle. Before this virus was proved to be filtrable, Nocard and Rous,⁴⁵ by one of the most brilliant strokes in research, succeeded in cultivating the causative organisms by means of cultures in sterile collodion sacs, which were incubated in the peritoneal cavity of the rabbit. Finally, by means of the most improved lenses, the small organisms, now regarded as the smallest visible microscopical forms, were demonstrated.

For several years the routine diagnosis of rabies has depended on the histological examination of the content of the ganglion cells of the hippocampus major and other portions of the suspected brain tissue for the presence of the cell inclusions first demonstrated by Negri,⁴⁶ and since proved to be characteristic of rabid brain tissue. No proof, however, exists that the Negri bodies, although diagnostic, are of etiological significance.

The virus of acute anterior poliomyelitis has received considerable attention during the last few years. Flexner⁴⁷ and his associates isolated a globoid organism, which they claim is the specific causative agent; at the same time Rosenow⁴⁸ and his followers have conducted extensive studies with cocci isolated from the spinal fluid of poliomyelitis cases, including inoculation into monkeys, serum reactions, and the limited use of experimental antisera—all with promising results.

The streptococcus is generally regarded as closely related to scarlet fever, but no definite proof exists as to its specific properties.

Mallory and Medlar⁴⁹ have reported the presence of *Bacillus scarlatinæ* in the tonsillar crypts, trachea, and lungs of scarlet fever patients.

Typhus fever, comparatively recently, has been the subject of investigation by Plotz,⁵⁰ who succeeded in isolating a small anaerobic bacillus which he was able to check up by means of animal inoculations.

Active Immunity.—It is especially interesting and of promising significance to note that, among nearly all of the diseases of this group, one finds that in those individuals who survive the infections there exists an extraordinarily high immunity. Active immunity, relatively permanent in duration, characterizes this group of viruses. Because of this fortunate fact it has been possible to develop methods of artificial immunization against a number of these diseases and, in some instances, specific substances for therapeutic treatment.

By treating naturally immune animals, of susceptible species,

with relatively large doses of the virus in question, effective antisera have been developed for the specific treatment of a few of these diseases. Among these may be mentioned the antisera of foot-and-mouth disease, hog cholera, and cattle plague.

For a number of these diseases vaccines are available. Smallpox vaccine, the pioneer biologic preparation, is prepared by passage of the smallpox virus through the bovine species, thus modifying its virulence. The Pasteur treatment for rabies, successful for so many years, consists of the fixed virus, attenuated by drying or dialysis.

FILTRATION EXPERIMENTS.

Variations in Filters.—The simplest filter, with the exception of paper, which of course is not impervious to bacteria, consists of diatomaceous or infusorial earth. This may be arranged in layers, pressure applied, and colloidal material retained in the filter. Berkefeld filters are made in three different grades of porosity—small, medium, and large. The ordinary Berkefeld filter, or filters of this type, should always be tested before use, as imperfections are frequently found. The Mandler filter, manufactured by the Infusorial Products Company, Toledo, O., is recommended as a satisfactory candle. Doubtless the results of many uncontrolled and inaccurate filtration experiments have been reported because of faulty filters. A simple test, described by Ferry,⁵¹ originally reported by Bulloch and Craw,⁵² consists in attaching the filter candle to a compressed air tube, through which the pressure is registered on a gauge. The filter is then immersed in a glass container filled with water, the air pressure applied, and observation made of the air bubbles as they escape through the pores of the filter into the water. For ordinary filtration work the filter candle should maintain 8 to 12 pounds pressure, while the escaping air bubbles should be uniform in size and density over the entire surface of the candle. Imperfections, when found, usually occur near the base or joint of the filter.

Filters of finer degree of porosity are illustrated by the Chamberland and Pukall candles, which are made of porcelain. The virus of foot-and-mouth disease will readily pass through the more porous Berkefeld filters, but, if it is forced through the porcelain filter a few times, the infective agents are retained. The virus of many other infections, such as those of chicken plague and hog cholera, will pass through the finest porcelain, even after repeated passages through the same filter.

A further development in filtration experiments has been brought about by means of the "ultrafilter." The method was first devised by chemists for the purpose of holding back colloid material. It consists in the use of ordinary filter paper, which is thoroughly im-

pregnated with collodion, gelatin, or agar. Bechold has constructed an improved apparatus based on this method. Filter papers, properly impregnated with collodion, are placed on perforated discs so constructed that pressure of known degree may be applied. Fluids pass through such a filter with comparative difficulty. Smallpox virus has been first covered by layers of agar, which retained the infective agents, as no virus was contained in the filtrate. Betegh⁵³ has succeeded in demonstrating that hog cholera virus may be retained by the Bechold filter.

These experiments show that among this group of viruses the infective agents in some instances may be retained by filters of sufficiently small porosity, thus suggesting that there exist specific ultravisible, pathogenic bodies of different size.

Filtration by gravity alone, or with very low pressure, results in the passage of small motile, flexible microorganisms. When relatively strong pressure is used, small particles are rapidly forced into the canaliculi of the filter, thus filling the pores of the filter and blocking further passage.

In conducting filtration experiments, therefore, it is necessary to observe the following points: Variation in filtration, absorption of colloidal material, pressure used in filtration, and time of filtration. Finally, in order to prove that the filtration experiment has been accurately and successfully carried out, the experiment should be controlled by cultural and inoculation tests. Cultures made on various artificial media from the filtrate should remain sterile. This proves that no known bacterial forms can be passed through the filter. The inoculation of animals susceptible to the virus, supposed to be contained in the filtrate, should result in the production of the disease in question, involving phenomena typical to the disease, such as proper period of incubation, typical symptoms, death, and characteristic lesions. One of the difficulties involved in the study of filtrable viruses depends on the fact that the specific virus in most cases can be recognized only by inoculation of susceptible species of animals. For illustration, hog cholera virus will produce the disease only in swine, the various species of ordinary laboratory animals being entirely insusceptible to hog cholera virus.

Wolbach, Chapman and Stevens⁵⁴ have conducted some interesting filtration experiments from which they conclude that "trypanosomes from cultures and from animal tissues are not filtrable through bacteria-proof filters."

Novy and MacNeal⁵⁵ have reported the successful passage of *Spirochæta duttoni* through Berkefeld filters. Wolbach and Binger⁵⁶ have cultivated two filtrable spirochetes, *Spirochæta elusa* and *Spirochæta biflexa*, both isolated from water.

ULTRAMICROSCOPY.

No successful work has been done toward the development of microscopical methods which will demonstrate the small organisms assumed to be present in the viruses of this group of diseases. According to Loeffler,³ Abbé and Helmholtz estimate the limit of microscopical vision as about 0.2 micron. In other words, a microorganism which is larger than 0.2 micron may be seen distinctly by means of a properly constructed and adjusted system of lenses. An organism less than 0.2 micron in diameter may be magnified by means of powerful lenses, but in so doing the distinctness of the image is obliterated, so that no accurate vision of the image can be obtained.

It is, of course, a well-known fact that there is a great variation of size among the ordinary bacteria forms. One of the smallest known pathogenic organisms is the *Bacillus influenzae* of Pfeiffer, which is about one micron in length and four-tenths microns in width. The small *Bacillus murisepticus* is a tiny organism in contrast to the large, square-ended *Bacillus anthracis*. Since there exists such a variation in size and form among bacteria which are well known, it seems quite logical to believe that there are living microorganisms smaller than the influenza bacillus or the bacillus of mouse septicemia, which, under present conditions as to microscopical facilities, are ultravisible. Moreover, it seems reasonable to conclude, from the results of various filtration experiments in which filters of varying degrees of porosity are used, that this group of ultravisible microorganisms may vary among themselves as to size and form.

In attempting to perfect means by which the range of microscopic vision might be developed still further, investigators have attempted to work with light of shorter wave lengths than ordinary light. Ultraviolet rays, whose wave lengths are only one-half as long as ordinary light, have been tried and found to be of no practical advantage.

Among various staining methods which have been tried are those which were submitted by Loeffler and others for the purpose of rendering visible the flagella of bacteria. Such methods, however, appear to be of no avail when applied to the various ultravisible viruses.

The dark ground illumination method, which was developed a few years ago and which has found a place in practically every working bacteriological laboratory, probably represents the most successful practical advance of recent years in perfecting the technic of microscopical observation. By means of the dark ground illuminator the images of small microscopical forms are reflected by strong light on a dark background, thus affording a means of studying to great advantages small micro-organisms in the living condition.

Such an apparatus is almost indispensable in studying such forms as spirochetes.

ARTIFICIAL CULTIVATION.

Cultural experiments have been made with practically all of the viruses involved in this group of diseases. In so far as artificial cultivation of a given virus is concerned, the problem depends on the simulation of conditions existing in the host, as related principally to food requirements and thermal conditions. It is for this reason that ordinary bacteria, which thrive on living or dead tissue, prefer artificial culture media in which beef bouillon and peptone form a basis, while, at the same time, soil bacteria flourish on artificial media composed of soil infusions.

Attempts have been made to cultivate the ultravisible viruses on every conceivable kind of culture media, including fluid and solid media with acid, neutral, and alkaline reaction, subjected both to aerobic and anaerobic conditions, and to various oxygen pressures, with the addition of small particles of tissue, fresh blood, dissolved blood, albuminous materials of various kinds and their cleavage products, different sugars and other combinations which it has been possible to devise.

Mention has already been made of the wonderful work of Nocard and Roux,⁴⁵ who succeeded in growing the virus of cattle pleuropneumonia by means of the collodion sac. This method has been unsuccessfully tried with other filtrable viruses. Borrel⁵⁷ succeeded in culturing the virus of sheeppox under the skin of the abdomen of sheep, but it was not possible to demonstrate the character of the organism present in the fluid which accumulated in the artificial abdominal pocket. Borrel found that the fluid obtained from such an artificial culture was active in dilutions of from 1:10,000 to 1:20,000. He also showed that healthy sheep could be protected against the disease by the simultaneous use of this virus and anti-sheep serum in proper amounts.

Marchoux⁵⁸ succeeded in artificially cultivating the etiologic factor of fowl pest on a culture medium consisting of glucose agar, upon which was placed a layer of defibrinated chicken blood. After several days' incubation a second culture was inoculated from the first; from this a third culture, and so on until ten generations had passed. After ten generations on this artificial culture medium, $\frac{1}{2}$ c.c. of the fluid killed fowls in two days, and Borrel estimated that the dilution of the original virus was of such degree that the fowls which received the killing dose of virus from the culture representing the tenth generation were inoculated with approximately 1 c.c. of the original virus, diluted in a volume of fluid equal to the size of the earth. Thus it was shown that actual multiplication took place in Marchoux' artificial cultures, but the nature of the ultravisible organisms remained undetermined.

The work of Plotz in connection with typhus fever and that of Flexner and Noguchi, as well as the work of Rosenow, of the Mayo Clinic, in studying poliomyelitis, have been mentioned. It is quite possible that the etiologic factors involved in some of these diseases may prove to be organisms which have been entirely overlooked, and which are not ultravisible or noncultivable. Failure to recognize some of these forms may be due entirely to the wrong choice of conditions under which they have been studied, and the absence or neglected observation of various significant clues which might lead to their identity. As an illustration of this point, many will remember the work of Dr. Theobald Smith, and his associates years ago, in attempting to determine the cause of Texas fever in cattle. These workers carried out an extensive series of experiments on the blood of cattle infected with Texas fever, as well as carefully planned isolation experiments for the purpose of determining the mode of transmission of the disease. The latter work resulted in the clear demonstration of the role of the cattle tick as the intermediary host. After this was determined, elaborate work was done on the parasite, including the histological study of many serial sections of the cattle tick, in the hope that the Texas fever organism in certain stages of its life cycle might be found in some of the sections. Finally the outcome of the problem, in so far as the recognition of the organism concerned looked almost hopeless until one of the workers observed some small, pear-shaped bodies in the red blood corpuscles of cattle suffering from the disease. Comparison of smears of this blood with those made from healthy cow's blood showed the absence of the peculiarly shaped bodies in the red blood corpuscles of the blood of normal cattle. Diligent study, with this clew in hand, led to the absolute conclusion that these pear-shaped bodies were protozoans, and represented the specific etiological factor involved in Texas fever.

Strange as it may seem, the slides previously made, consisting of smears from a great number of infected cattle, and the sections of the cattle ticks which had ingested the blood of infected cattle, showed clearly the presence of this organism now recognized as *Piroplasma bigeminum*, the specific protozoan of Texas fever.

MORE IMPORTANT FILTRABLE VIRUSES RELATED TO THE SPECIFIC INFECTIOUS DISEASES OF MAN.

Under this head, one might consider rabies, smallpox, mumps, acute anterior poliomyelitis, yellow fever, measles, scarlet fever, typhus fever, trachoma, molluscum contagiosum, sand fly or pappataci fever, dengue fever, and foot-and-mouth disease.

RABIES (LYSSA).

Definition.—An acute infectious disease of warm-blooded animals, characterized by acute onset, mental excitement, convulsions, paralytic symptoms, and high mortality.

Etiology.—Filtrable virus (Remlinger (13).

Resistance.—The virus is destroyed in half an hour at temperature of 55°-58° C., by gastric juice in 4½ hours, and by bile in a few minutes. It is easily destroyed by ordinary antiseptic solutions. The virus is somewhat resistant to drying, freezing, and putrefaction.

Cell Inclusions.—Negri bodies are specific.

Cultivation.—Moon⁵⁹ has submitted a preliminary report, showing the results of successful cultivation of the virus on an artificial culture medium as demonstrated by inoculation experiments. Poor and Steinhardt⁶⁰ have described the results of their study of the virus after obtaining it free from the cells of the host and contaminating organisms. Noguchi⁶¹ reported the observations of multiplying nucleated bodies in artificial culture media inoculated with rabies virus. These nucleated bodies, which Noguchi regards as protozoa, were capable of producing the disease when inoculated into experimental animals.

Laboratory Diagnosis.—Accurate diagnosis is dependent on the observation of Negri bodies in the brain tissue of the animal transmitting the disease. Positive findings of Negri bodies may be verified by the inoculation of rabbits, subdurally, with suspensions of the suspected brain tissue. If positive, "dumb rabies" will be produced in 14 to 18 days.

Transmission.—Propagated chiefly by the dog. The virus is contained in the nervous system, and is transmitted in some of the secretions, especially the saliva.

Period of Incubation.—Varies; average is six to eight weeks. In some cases it has been less than two weeks and in others one year or more.

Immunity.—Active immunity originally determined by Pasteur, whose vaccine has been used successfully for many years. Passive immunity not established.

SMALLPOX (VARIOLA).

Definition.—"An acute infectious disease characterized by a cutaneous eruption, which passes through the stages of papule, vesicle, pustule, and crust" (Osler).

Etiology.—Filtrable virus (Casagrandi, 1908).

Filtrability.—Virus passes through Berkefeld filters.

Resistance.—Resists 50 percent glycerin for eight to ten months, or drying for several weeks. Destroyed at temperature of 58° C. in 15 minutes, and shows weak resistance toward ordinary antiseptic solutions.

Cell Inclusions.—Studied by Guarnier⁶² (1892) and Councilman, Brinckerhoff, and Tyzzer⁶³ (1906), and thought by some to be specific protozoa.

Cultivations.—Belin⁶⁴, Steinhardt, Israel, and Lambert⁶⁵ (1913) have recorded the results of the incubation of the virus of vaccinia in tissue cultures. A definite multiplication or increase was noted, but no specific bodies were observed.

Laboratory Diagnosis.—Force⁶⁶ suggests the intradermal inoculation of vaccinia immune rabbits with the vesicular contents, which will produce an allergic reaction.

Transmission.—The virus is readily transmitted by fomites and by individuals who have come in contact with the disease.

Period of Incubation.—Nine to fifteen days.

Immunity.—Active immunity originally observed by Jenner. Passive immunity not successful.

MUMPS.

Definition.—"A specific disease characterized by fever and swelling and tenderness of the salivary glands, usually of the parotids, but sometimes of the submaxillary and sublingual glands" (Osler and McCrae).

Etiology.—Filtrable virus reported by Granata⁴³ (1908) and by Gordon⁴⁴ (1914), confirmed by Wollstein,⁶⁷ who succeeded in developing parotitis and orchitis in experimental animals from inoculations of sterile filtrate of infected saliva.

Transmission.—Usually by direct contact.

Period of Incubation.—Average period is about three weeks.

Resistance.—The virus is destroyed at 55° C.

Laboratory Diagnosis.—Feiling⁶⁸ calls attention to blood changes, including lymphocytosis, which are of value in differentiating mumps from other inflammatory swelling of the parotid and submaxillary glands.

Immunity.—Active immunity is usually conferred by one attack.

ACUTE ANTERIOR POLIOMYELITIS.

(Infantile paralysis, Heine-Medin's disease.)

Definition.—"An acute infection occurring in both epidemic and sporadic forms, characterized anatomically by wide-spread lesions of the nervous system, with special localization in a majority of cases, in the anterior horns of the gray matter in the spinal cord" (Osler).

Etiology.—Filtrable virus (Lentz,²⁷ Landsteiner and Levaditi,²⁸ Flexner and Lewis²⁹).

Filtrability.—Virus passes through Berkefeld and Chamberland filters.

Resistance.—Resists glycerin one month, drying and freezing for several weeks. Destroyed in half an hour at temperature of 45° C. and by relatively weak antiseptic solutions. Dochez⁶⁹ has shown that it survives the action of the gastric and intestinal secretions when swallowed.

Cultivation.—Flexner and Noguchi⁷⁰ have successfully cultivated the virus under anaerobic conditions, and have identified the specific microorganism as consisting of "globoid bodies measuring from 0.15 to 0.3 μ in diameter, arranged in pairs, chains, and masses, according to the conditions of growth and cultivation." This microorganism passes through Berkefeld filters. No attempt has been made to classify it, and it is not known what scale of living organisms these globoid bodies occupy.

Transmission.—Transmitted experimentally through monkeys by injecting the virus as found in the central nervous system. Natural method of transmission is not known.

Period of Incubation.—Five to ten days.

Immunity.—Active immunity has been produced experimentally by the use of graded doses of virus.

Passive immunity, according to the experiments of Flexner and Lewis on monkeys, is possible.

YELLOW FEVER.

Definition.—"A fever of tropical and subtropical countries, characterized by a toxemia of varying intensity, with jaundice, albuminuria, and a marked tendency to hemorrhage, especially from the stomach, causing the 'black vomit'" (Osler).

Etiology.—Filtrable virus, Reed and Carroll,⁸ 1901.

Filtrability.—Passes through Berkefeld and Chamberland filter B.

Resistance.—Destroyed in ten minutes at temperature of 55° C. and at 24°-30° C. in 48 hours.

Transmission.—By mosquitoes, *Stegomyia fasciata*. Cannot be transmitted by fomites. The blood of the patient appears to contain the virus for a period of only about three days after disappearance of symptoms.

Period of Incubation.—Forty-one hours to five and one-half days (experimental).

Immunity.—Active immunity usually follows one attack, as shown by evidence submitted by Carter.⁷¹

(MEASLES.)

Definition.—"An acute, highly contagious fever, with specific localization in the upper air passages and in the skin" (Osler).

Etiology.—A filtrable virus (Goldberger and Anderson³³). Found in the blood, buccal, and nasal secretions and in the skin. The Rhesus monkey is susceptible to the disease through inoculation with the blood of patient.

Filtrability.—Virus passes through Berkefeld filters.

Resistance.—Virus resists drying or freezing for 24 hours. Destroyed by a temperature of 50° C. in 15 minutes.

Laboratory Diagnosis.—Blood examination shows a leucopenia and eosinopenia (Hecker ⁷²).

Transmission.—Direct contagion is very common. Transmitted by fomites.

Period of Incubation.—Seven to eighteen days; average incubation period is about 14 days.

Immunity and Mortality.—According to Herman,⁷³ 44,080 deaths occurred from measles in the United States from 1900 to 1910. About 30,000 cases are reported annually in New York City, and it is estimated that 95 percent of the entire population of this country are infected with measles at some period of life.

Infants under 5 months are relatively immune. One attack of measles usually confers immunity for life. Herman suggests the inoculation of children under 5 months old with active filtered virus for protective purposes. Passive immunity not successful.

SCARLET FEVER (SCARLATINA).

Definition.—"An infectious disease characterized by diffuse exanthem and an angina of variable intensity" (Osler).

Etiology.—Little definite knowledge exists as to the nature of the cause. Bernhardt³⁴ and Cantacuzene³⁵ reported the successful infection of monkeys with bacteria-free Berkefeld filtrates.

Resistance.—The virus is quite distinctive in that it is relatively resistant toward ordinary methods of disinfection. The infective agent survives drying for some time.

Cell Inclusions.—Mallory⁷⁴ (1904) described protozoan-like inclusions in the skin lesions. Ross⁷⁵ found large cell inclusions within the cytoplasm of the large lymphocytes during the acute febrile period.

Bacteriology.—*Streptococcus pyogenes* is found in the nasal secretions, in the throat, and in the blood of patients. Class⁷⁶ found a diplococcus in the secretions of the throat and later Schultze⁷⁷ and also Ferry⁷⁸ found a diplococcus somewhat similar to the form described by Class. Pryer and Kelly⁷⁹ have isolated a plemorphic diphtheroid, which varies from a coccus to a rod-shaped form. Mallory and Medlar⁴⁹ have described *Bacillus scarlatinæ*, which they regard of etiological significance.

Transmission.—The disease is extremely contagious. The infection is carried by clothing, bedding, furniture, and successful disinfection is difficult.

Period of Incubation.—One to seven days, oftenest 2-4 days.

Immunity.—Active immunity is conferred by one attack.

TYPHUS FEVER.

(Hospital fever, spotted fever, jail fever, camp fever, ship fever.)

Definition.—"An acute infectious disease of unknown origin, highly con-

tagious, characterized by sudden onset, maculated and hemorrhagic rash, marked nervous symptoms, and a cyclical course terminating by crisis" (Osler).

Etiology.—Nicolle³⁹ reported the filtrability of the European virus. Ricketts and Wilder,⁸⁰ Anderson and Goldberg,⁸¹ Gavino and Girard,⁸² working with the American virus, were not able to confirm Nicolle's results.

Filtrability.—Nicolle was able to pass the virus through the coarser Berkefeld filters.

Resistance.—The thermal death point of the virus is 55° C.

Cultivation.—Ricketts and Wilder observed a few small bacilli in the blood of Mexican patients. Plotz⁵⁰ describes a bacillus as the specific cause.

Transmission.—Transmitted by the body louse (*Pediculus vestimentorum*). The virus is present in the blood, especially a few days after the fever has appeared, and the infection is probably present in expired air and on the skin. The infectious agent is carried by fomites.

Period of Incubation.—About 12 days.

Immunity.—Active immunity follows one attack. Slight passive immunity follows the injection of the specific antiserum.

TRACHOMA.

Definition.—"An inflammation, generally of lengthy duration, accompanied by hypertrophy of the conjunctiva and formation of granules, with subsequent cicatricial changes" (May).

Etiology.—There is more or less secretion from the inflamed tissues; the secretion affords a carrier of contagion. The filtrable nature of the virus was observed by Bertelli and Cecchetto²⁶).

Filtrability.—The virus passes through the Berkefeld filters.

Resistance.—Not determined.

Cell Inclusions.—Some observations have been made of inclusion bodies in the affected conjunctival tissue cells.

Transmission.—By contact with the secretions. When one eye is involved, frequently transferred to other eye. The disease spreads in schools and public institutions by means of towels, handkerchiefs, etc.

MOLLUSCUM CONTAGIOSUM.

Definition.—"Small, soft, multiple growths of the skin, most frequent on the face, arms, and chest, and in the external genital organs. They are lobulated and contain cells similar to those of the rete malpighii" (Delafield and Prudden).

Etiology.—Filtrable virus described by Juliusberg,¹⁷ found in the degenerated epithelial cells.

Filtrability.—According to Juliusberg the virus passes through the Chamberland filter.

Cell Inclusions.—Round or ovoid bodies are found within the cells, crowding the nuclei to one side. Some investigators believe these to be protozoa.

Transmission.—By contact through skin abrasions.

PHLEBOTOMUS FEVER.

(Sand fly, three-day or Pappatigi fever.)

Definition.—"A fever of two or three days' duration, caused by the bite of the sand fly *Phlebotomus pappataci*." A tropical disease.

Etiology.—Filtrable virus described by Doerr.²³ Active immunity follows one attack. Passive immunity not established. The virus present in the blood of the patient.

DENGUE (DENGUE FEVER).

Definition.—"An acute infectious disease of tropical and subtropical regions, characterized by febrile paroxysms, pains in the joints and muscles, an initial erythematous and a terminal polymorphous eruption" (Osler).

Etiology.—Filtrable virus described by Ashburn and Craig.²⁰

Filtrability.—Virus passes through bacteria-proof Berkefeld filters. The virus is present in the blood.

Transmission.—Transmitted by bite of the mosquito, *Culex fatigans*.

Immunity.—Active immunity of several years' duration follows one attack. Passive immunity not determined.

FOOT-AND-MOUTH DISEASE.

Definition.—An acute disorder, marked by its extreme infectiousness and rapid dissemination, and characterized by fever and the appearance of vesicles in the buccal cavity and around the coronet of the foot.

Etiology.—A filtrable virus as determined by the pioneer work of Loeffler and Frosch.²

Filtrability.—The virus passes readily through the ordinary Berkefeld filters, but, if passed many times through the porcelain filters (Chamberlain), it is held back (Loeffler³).

Resistance.—The virus is destroyed in 10 minutes at 50° C., drying for 24 hours, freezing for five weeks and by the addition of the common antiseptics.

Cell Inclusions.—Siegel has observed certain cell inclusions to which he ascribed pathological significance.

Transmission.—The disease is contagious and is transmitted to man rather rarely, frequently to cattle, sheep, and swine, and sometimes to other domestic animals.

Immunity.—Active immunity follows one attack. Passive immunity can be shown by the injection of serum from immune animals.

GROUPING OF ULTRAVISIBLE VIRUSES ACCORDING TO FUNCTIONAL ACTIVITY AND ATTENDING PHENOMENA.

In attempting to classify these diseases we find that there are practically only two features which are common to all—namely, the marked infectivity of the viruses and the production of active immunity conferred by one attack of the disease in question. There are, in addition, several variable features, so different, in fact, that very little assistance may be derived from their use in attempting to classify the group of viruses. These variable features include the following:

1. Production of passive immunity.
2. Methods of transmission.
3. Resistance to chemical agents, drying, and putrefaction.
4. Presence of secondary infection.

In some few instances passive immunity has been demonstrated, as illustrated by the antisera for the treatment of hog cholera and foot-and-mouth disease. With the majority of these viruses, however, the experimental production of passive immunity has not been successful, which would indicate the absence of specific toxin production.

The transmission of this group of diseases, as shown by Walbach,⁸³ is brought about in various ways, and may be classified under the following heads:

1. Intermediate hosts.
2. Contact.
3. Air borne.
4. Fomites, skin abrasions, and unknown means of dissemination.

Those viruses, which are transmitted by biting insects, are dengue (*Culex fatigans*), yellow fever (*stegomyia fasciata*), and African horse sickness (*Anopheles* and *Stegomyia*). Some other viruses are probably transmitted by insects or parasitic organisms which may not act as necessary intermediary hosts.

A few of these viruses require direct contact in order to produce infection. Such consist of infectious agalactia of sheep, infectious stomatitis of cattle, fowl diphtheria, fowl pest, cattle plague, and pleuropneumonia of cattle. Probably many of these viruses may be borne by the air, such as foot-and-mouth disease, scarlet fever, smallpox, and hog cholera.

The majority of the viruses belonging to this group are disseminated in various ways, including fomites and unknown methods of transmission, rabies, chicken sarcoma, and molluscum contagiosum find their entrance by means of an abrasion in the skin or tissues.

Sufficient work has not been done to classify successfully the ultravisible viruses according to their relative resistance to chemical agents, drying, and putrefaction. From results obtained thus far it has been shown that there exist great variations, especially in regard to the action against various antiseptic solutions and chemical reagents. Meyer⁸⁴ gives a very interesting summary of some of the results which have been obtained, and which point to the importance of further carefully planned tests in order to group systematically the viruses according to their resistance toward different chemicals.

Secondary infection is an important factor in connection with most of the diseases which may be classed under those of unknown etiology. As a good illustration of this, mention might be made of the streptococcus in connection with scarlet fever; the pneumococcus, streptococci, and the staphylococci in measles; *bacillus necrophorus*, *bacillus cholerae suis*, and various pyogenic bacteria in hog cholera; and pyogenic cocci in poliomyelitis.

It will be seen that the study of filtrable viruses has only begun and offers a wide field for investigation. We are positive of only a few facts in connection with them, the more important of which are that they are ultravisible, as far as it has been possible to determine up to the present time, that they are extremely contagious. that most of them are filtrable through the finest porcelain filters,

that the viruses are pathogenic even in extreme dilutions, that the production of active immunity is a common characteristic, and that passive immunity production, so far as has been determined, is practically absent.

Some of these diseases may be due to organisms which may readily be seen at certain stages in their life cycle, but which as yet have not been observed because of their possible dissimilarity to other microscopic forms which are better known. Some may be due to protozoan forms, the specific identity of which is difficult to determine; others may be due to spirochetes or some other forms of microscopic life which are capable of breaking up into small constituents, thus permitting their passage through fine filters, and rendering them ultravisible; others may be due to ordinary bacterial forms which present methods of microscopical technic and artificial cultivation are unable to detect.

No field of research is more inviting than that of the study of the ultravisible viruses. The fundamental study of any specific infectious disease is based on the observation and accurate identification of the specific causative factor. If the specific organism is known and thoroughly studied, it is then usually possible to determine in a scientific way and with accuracy the pathology and proper therapeutic measures. Before attempting to develop preventive and curative measures, the specific causative organism should, if possible, be determined. When this is once recognized, general methods now in use in connection with other diseases may be applied without difficulty, and often with success, in attempting to formulate methods for prevention and curative treatment.

There can be no doubt, therefore, that this field requires more intensive study than it has heretofore received, and that it offers to the research worker the finest opportunity for practical achievement.

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INTESTINAL OBSTRUCTION DUE TO A MECKEL'S DIVERTICULUM—"DUODENAL DEATH?"—WITH A CASE REPORT.

By C. J. HABHEGGER, M.D., Watertown, Wis.

The following case of intestinal obstruction occurred in a school girl, H. F., aged 8, who had never been sick and, except for a fracture of the left thigh at the age of 3, which healed without deformity or subsequent disability, had never had medical treatment.

She gave no history of any abdominal pain or tenderness previous to the onset of her present trouble. The family history is negative, the mother is alive and well, the father having been accidentally killed a number of years ago. Six sisters and four brothers are alive and well.

She was taken sick November 26, 1917, with severe abdominal pains. The pains were intermittent and crampy and were followed in a few hours later by vomiting, first, of mucus and bile and later of dark brownish material. No bowel movements or passage of gas was noted after the onset of the pain, which recurred at irregular intervals.

Examination.—(Ten hours after the onset of the illness). The first impression of the patient was that she was desperately ill. She was very pale, and the extremities were cold and clammy, and she lay in a sort of sleep or stupor, from which she could be aroused by loud speaking or shaking. She was apparently in no pain at the time of the examination and immediately lapsed into a sleep when left alone. The mother stated, however, that at times she would wake up and moan and complain of severe pain. Her mentality otherwise was good and she answered questions intelligently.

Pulse was soft and thready and irregular. Temperature, subnormal. Blood pressure, 40. Facial expression, natural, not anxious. Mucous membranes pale. Breathing shallow and rapid but not labored. Chest: lungs and heart normal. Abdomen; uniformly distended; diffuse tenderness over the lower part of the abdomen, but not confined to any particular point; on deep percussion, tympanitic everywhere, light percussion more tympanitic in the flanks than in other parts of the abdomen; muscular rigidity was absent, and the resistance of the abdomen was about the same everywhere; no gurgling could be heard anywhere over the intestines; rectal examination revealed nothing abnormal.

The child grew progressively worse in spite of stimulation, and

all measures to relieve the bowels were fruitless. She died a few hours later, less than 23 hours after the onset of the pain, in a stupor with all the symptoms of a collapse due to intense intoxication.

Autopsy.—November 28, 1917. The body was that of a well nourished child eight years of age. The abdomen was somewhat discolored. Postmortem rigidity was present. The abdomen only was examined. On opening it a large mass of reddish, bluish black small intestine presented itself—quite distended, and filling the whole cavity. On lifting up this mass of small intestine, the normal pinkish yellowish large intestine surrounded it like a frame.

The stomach was normal in appearance. The peritoneum covering the small intestine was smooth and shiny, as was also the parietal peritoneum. There was no exudate or fluid in the peritoneal cavity. On further examination of the small intestine it was noted that it was strangulated by a round band, which encircled the base of this mass of discolored bowel (Figs. 1 and 2). The intestine involved was the jejunum at its junction with the duodenum and the ileum within a few feet of the cecum. This round band was about 4 inches in length, was attached to the ileum about 2 feet above the ileocecal valve and on its other extremity to the root of the mesentery of the jejunum near the spine; through this opening, about four inches in diameter, about 12 feet of the small intestine had prolapsed. The band was about the size of a lead pencil, thicker at the point where it was attached to the ileum and smaller as it approached its other extremity. It was hollow for about an inch of its intestinal attachment, communicating with the intestine. Through the opening, it had formed with the mesentery and the bowel, the intestine had prolapsed in about four loops, leaving only a few feet of the small intestine which were not involved. Upon opening the bowel, it was found to be filled with a dull red, grumous looking fluid. The mucous membrane of stomach was congested and showed ecchymotic spots. There were no other findings in the abdomen.

Remarks.—In the diagnosis of this case, two conditions were considered, intestinal (dynamic) obstruction, and paralytic ileus. The clinical picture in which the symptoms of collapse, apathy, and stupor, were in the foreground did not seem to fit either condition. While there was obstruction of the bowel as shown by the absolute obstipation, vomiting, etc., there was added to this a severe toxemia. For ileus, due to peritonitis, the picture lacked the classical facies, the local findings, and also the temperature and the history of previous abdominal trouble.

That it was a surgical case was self-evident. Operation was not feasible for obvious reasons. In attempting to correlate the symptoms of this case with the postmortem findings one is struck



Fig. 1.—Anterior view, showing (by arrow) constriction of intestine.



Fig. 2.—Posterior view, showing loops of intestine involved.

by their similarity to those of experimental and postoperative cases of intestinal obstruction of the duodenum or the beginning of the jejunum.

Experimental work has shown that animals where an artificial obstruction is placed high up, succumb very rapidly as compared to those where the obstruction is low down, and that death seems to be due to a toxin elaborated in the duodenum.

According to Stone, Bernheim and Whipple (*Annals of Surgery*, LIX), dogs so operated showed early that they were very sick. They refused food, vomited, and had every appearance of being intoxicated. A noticeable dullness and apathy began to develop. Slight muscular tremors commenced. The gait, especially of the hind legs, became staggering and ataxic, weakness and muscular tremors rapidly increased and the pulse became very weak and thready. Near the end there was a marked fall in blood pressure, a subnormal temperature, and great prostration. There seemed to be no pain. Their conclusions based on numerous animal experiments are as follows:

In dogs one may isolate, by double ligatures, a loop of the duodenum and high jejunum and reestablish the continuity of the alimentary tract about the closed loop; such a condition is rapidly fatal.

The conditions of the experiment may be so controlled as to exclude circulatory disturbances, food derivatives, gastric, pancreatic, and biliary secretions as possible causes of death.

The dogs die with characteristic symptoms and present typical autopsy findings, the whole course of the postoperative disturbances suggesting an intoxication of some sort.

A fluid collects within the closed loops that is highly toxic, producing, when injected into normal dogs, a reaction much like that of dogs with closed loops. This toxin is believed to be the cause of death.

The toxin is formed by the mucosa of the closed loop, some of it being secreted into the lumen, and some remaining within the cells of the mucosa.

If the closed loops be drained externally, the postoperative course of the animal is altered, but varying degrees of intoxication still are observable, and the presence of toxin within the mucosa of the drained loops is demonstrable.

Absorption takes place not only from the loop contents but from the mucosa direct, the latter being a quite important source of intoxication.

There are various possible explanations for the perversion of function that causes the mucosa to become a source of intoxication, but none are yet proved. The fundamental explanation of the change is as yet unknown.

It is possible by the repeated injection of sublethal amounts of the toxin to immunize dogs against fatal doses.

The parenchymatous organs, spleen, intestinal mucosa, etc., and particularly the liver, seem to be especially concerned in the production of the resistance against the toxin when dogs are immunized.

The extract of an immunized dog's liver, properly handled, will destroy the toxin *in vitro*.

We believe that the intoxication observed in closed loops is quite similar to that existing in simple obstruction and that the same toxin is the essential agent causing death in each instance.

The discovery of the importance of absorption from the mucosa, even in drained loops, leads one to think that the establishment of an enterostomy for drainage in clinical cases may not meet all the requirements for successful treatment.

It may be possible to develop a method of direct defense against the toxin, as an auxiliary to the surgical relief of obstruction conditions.

CHRONIC TORTICOLLIS AND ITS OPERATIVE TREATMENT, WITH REPORT OF THREE CASES.

By ALFRED H. NOEHREN, M.D., F.A.C.S., Buffalo, N. Y.

Chronic torticollis is a condition in which there is a tonic contraction of the sternomastoid muscle of one side, sometimes accompanied by contraction of other muscles of the neck. As a result of this, the head is tilted over to the affected side, the corresponding shoulder is raised, and the head is rotated so that the chin points upward and toward the opposite side. Where this condition has existed for some time, there is a compensatory curvature of the spine and the half of the face on the affected side is often smaller than the other half. Sometimes there are other deformities of the face or ears and the eyesight may be defective.

A child with this deformity looks smaller than the normal child, cannot play like other children, is apt to be teased by his playmates, and is handicapped in many ways. The longer the condition exists, the greater is the harm to the proper development of the child. A cure is therefore very desirable and should not be neglected in any suitable case, especially as it is so easily accomplished.

Chronic torticollis may be either congenital or acquired. Some of the causes of acquired torticollis are injury at or after childbirth, sore throat, enlarged cervical glands, defective eyesight, especially myopia, and contractions from burns. There is one rather uncommon form called spasmodic torticollis, which is caused by chronic nervous irritation, and requires division of the spinal accessory or other nerves, involved in addition to the usual treatment. It is much more difficult to cure than the common form.

Where torticollis is caused by caries of the spine or acute inflammation of the cervical glands, these conditions should first be treated, as they are the primary conditions and their cure would probably correct the torticollis.

The treatment of the common form of chronic torticollis is operative. If the case is not of long standing or very slight, correction without operation may be possible. In all other cases free division of the affected muscle and all contracted bands is necessary. This is best done by an open operation.

Operation.—The patient is etherized and placed on the table, with the shoulders elevated by a sand pillow. An incision from one-half inch to one inch and a half long is made through the skin and platysma just above the clavicle, between the sternal and clavicular heads of the sternomastoid muscle, preferably in a diagonal direc-

tion. As the skin is very movable, the incision can usually be shifted over a larger area so that a longer incision is not necessary. Great care should be used not to injure any important structures, especially the internal jugular vein, which lies under the sternal head of the muscle.

The sternal head of the sternomastoid muscle is now brought into the wound, a grooved director or Kocher's sound placed beneath it, and its fibers divided. The clavicular head is treated in the same manner. The head is then twisted in the opposite direction, bringing all contracted tissues of the affected side on the stretch. These bands are now carefully divided one after the other until the head is perfectly free. Usually there is no bleeding, but if there is, it must be carefully controlled, after which the wound is closed without drainage by means of a continuous catgut suture.

The head is now brought into an extreme overcorrected position and a plaster of Paris bandage applied, passing over the head and around the chest, being careful to draw the head toward the opposite shoulder, with the chin pointing toward the affected side.

This dressing is left on from one to two weeks, after which a cotton and gauze dressing may be placed around the neck with wooden or steel stays on the affected side. This latter dressing may be used for a week or two or may be dispensed with, according to the progress of the case.

After the head is no longer fixed by dressings, manipulations and systematic exercises must be instituted. Manipulations consist in forcibly approaching the head to the opposite shoulder and rotating it toward the affected side as far as possible several times a day.

The most important exercises are as follows:

Beginning with the head in the erect position:

1. Laterally flex head to opposite shoulder and return.
2. Rotate head toward affected side and return.
3. Flex head anteriorly, then extend posteriorly until patient looks at ceiling.

These exercises should be taken several times a day.

In addition to this, the child should be given a horizontal bar to hang on frequently to straighten his spine and should be encouraged to play with other children, turn somersaults, and in every possible way made to forget that he ever had a deformity. But if he shows a tendency to hold the head in the old position, he should be immediately corrected and at night he should not be allowed to assume his old position during sleep. A few weeks of this treatment is usually all that is necessary, after which the growing child will soon lose all traces of his former deformity.

CASE I.

R. W., boy, age 7. Severe contraction of left sternomastoid muscle for a long time. Left side of face smaller than right side, sight of left eye poorer than of right and slight internal strabismus. Few of cervical glands enlarged on right side, due probably to poor teeth. Head held in characteristic position with left shoulder high and corresponding scoliosis.

Operation.—September 18, 1914, at Deaconess Hospital. Ether anesthesia. Severed left sternomastoid tendons and several auxiliary bands completely through one-inch incision. Position of head overcorrected and plaster of Paris bandage applied. At urgent request of parents, patient taken home the same day. Cast removed on tenth day, wound perfectly healed. Head could be moved in all directions and scoliosis less marked. Started manipulations and exercises, and, though there seemed a tendency to recurrence at times, at the end of seven weeks head was held in perfect position, spine was almost straight, and boy looked much taller. Last seen August 25, 1918, with deformity perfectly cured.

CASE II.

J. M., boy, age 15. Ten years ago parents first noticed that patient held head to right side. Has been backward at school, could not get a good job, because, as he said, "I look so small," and has several times been arrested for juvenile delinquency. There was rigidity of right sternomastoid muscle, the head was inclined to the right, and there was a curvature of the spine. Had worn glasses for eight years.

Operation was advised, not only to correct his physical deformity, but also with the hope of improving his deficient mental and moral development.

Operation.—September 29, 1916, at Deaconess Hospital. Ether anesthesia. Diagonal incision one and one-half inches long. The muscle was isolated and divided as well as many fibrous bands. The internal jugular vein was exposed. One strand of muscle could not be reached through this incision, so a second small incision was made and this strand divided. Position of head was overcorrected and plaster of Paris bandage applied. This dressing was removed on the eighth day and a collar bandage applied for a week, exercises being given each day while the bandage was off. For sake of better control, patient was kept in the hospital for three weeks. Exercises were prescribed after leaving hospital, but poorly carried out. Nevertheless, the result was very good and when last heard from, December, 1917, it was said by his mother to be perfect and to have made a wonderful difference in the appearance of the boy. Unfortunately, it did not help his morals very much, as he has since been committed to the Randall Island Reformatory.

CASE III.

C. L., boy, age 6. Has had wry-neck ever since birth. Cervical glands on left side slightly enlarged. Slight curvature of spine. Contraction of right sternomastoid muscle, which, as in all the cases, stood out like a whip-cord.

Operation.—June 17, 1918, at Deaconess Hospital. Ether anesthesia. Through one and one-fourth-inch incision severed both heads of sternomastoid muscle, when head was easily overcorrected. Plaster of Paris bandage applied. Left hospital second day. Dressing removed on seventh day and collar dressing applied for a few days. Manipulation and exercises instituted. At first showed tendency to recurrence, but soon held head properly and in less than a month was perfectly cured.

THE ROLE OF MASTURBATION IN COMPULSION NEUROSES.

By GUSTAV F. BOEHME, JR., M.D.,

Psychiatrist, Educational Clinic, City College of New York; Assistant, N. Y. Neurological Institute; Neurologist, West Side German Dispensary and Hospital, etc.

Masturbation has been the butt for years of the physician and pseudo-psychologist. To it are attributed a myriad of psychiatric and neurologic conditions, and as a rule the effect of this accentuation of its role in disease upon the patient, usually of a psychopathic type, has been markedly deleterious. Better would it be by far for the practitioner to remember that it is *per se* a symptom, not a cause, and thus avoid traumatizing an already weakened neuro-psychic make-up. This thought is not a new one with the writer, but the report of the following cases may well demonstrate the detrimental effect of the accentuation of the masturbatory element in an individual's life.

CASE I.

A man, 48 years old, seen at the New York Neurological Institute. Complains of a marked nervousness; of insomnia, vague fear and an inability to do his work when supervised. Especially, however, he has a dread of "Eyes." As he said, "You can beat me, call me names, do anything you please, but don't mention the word eyes to me." He reads in the life of Lincoln of "Sympathetic eyes," in the papers Pershing's eyes are described as "Shrewd eyes," a woman's eyes are described as "melting," "liquid," "soulful" eyes, and he suffers the tortures of Hades, mentally. He asks, "Can eyes tell so much, they are only so small a part of the body, and yet they betray so much?" They tell you about the soul. How can that be possible?"

He married four years ago, hoping that well regulated married life would relieve him of his dread, but the contrary has been the result. When about to undertake sexual intercourse with his wife he sees her eyes, and the old fear, the same old dread comes over him and he cannot consummate the act. Always "Eyes" pursue him.

Physically he is a well nourished man, with a worried countenance, lively in expression. When he talks of eyes he widens his palpebral fissures, and points to his eyes from time to time. His neurological examination is negative for any organic defects. His Wassermann is negative.

A psychiatric examination reveals no evidences of insanity. He is well oriented; he has no hallucinations or delusions. His only psychic abnormality is the dread of "eyes." He realizes thoroughly the ridiculousness of his ideas and wants to be cured, if possible.

He comes from Vienna, and is of good family. As a boy of twelve he was sent to boarding school. Here he was taught masturbation by a much older boy. They practiced upon each other, and besides masturbatory methods, attempted other forms of sexual practices. This they continued until he was twenty-two. He never considered the acts in any way reprehensible. At this

time he was taken ill and treated by a physician and he was told of the horrors of his acts, of the possible insanity that might result from his malpractices. He recovered from his illness, but gradually there crept into his mind the thought of the social sins he had committed. Little by little there developed the dread of "Eyes," the thought that has haunted him from this time.

It was difficult at first to correlate definitely the dread of "Eyes" with his earlier practices, but one day he blurted out (what the examiner had already surmised), that people had told him that the practice of self abuse was betrayed by the eyes; he had read that masturbators had rings under the eyes. He had tried to dismiss the thought, yet subconsciously the dread of eyes exposing him was ever with him.

Psychotherapeutic measures are being tried upon him. Possibly there may still be some youthful trauma back of his neurosis, time alone with careful questioning can clear the final difficulty.

CASE II.

A girl, 13 years old, seen at the New York Neurological Institute, accompanied by her mother. Walks into the clinic with her head bowed down, hands clasped, with her legs widely separated, so that her gait is peculiarly waddling. Her complaints, described by her mother, are that she continually states that she has committed a great sin, or else she asks whether she has been very bad. She cries a great deal to herself and in the past two months has assumed the peculiar attitude described.

In appearance she is very frail. Her physical examination reveals no essential abnormalities. Her neurological examination shows increased deep reflexes generally and a slight stereotypy in her movements. There is no katonias.

Psychiatric examination reveals no abnormalities except a constant reiteration of the fact that she has sinned. There is no separation of personality. She is bright in school, and very docile and obedient.

Her postural condition is readily straightened out upon command. She immediately falls back into the condition previously described.

She has had all the ordinary diseases of childhood without any apparent sequelae. She began to menstruate four months ago.

One year ago she began her masturbatory habits. She used the pillow in the bed and "leg rubbing" as a means of exciting the orgasm. Two months ago, shortly before the onset of her present trouble, she went to confession. She was questioned as to her sexual habits, and admitted, without any feeling of shame, her actions. She was informed that these actions were a terrible sin, that she was committing a sin against God; as she says, "It must have been a terrible sin, I was given so many prayers to say." Shortly after began her eternal lament, "I have committed a sin," and the development of her peculiar posture.

On further questioning the posture was explained as follows: She walked with her head hanging, her body bowed, and her hands clasped, all representing, subconsciously, an attitude of penitence. She held her feet widely apart so that she could not possibly sin again.

The ultimate diagnosis in this child's case must be withheld because the age, the somewhat "Egyptian" attitude when sitting down, the lack of interest in anything but her sin, may well indicate a beginning dementia praecox. But this much is clear, that the psychic trauma occasioned by being told that masturbation is a terrible sin, in this instance acted as the excitant of a neurosis (or possible psychosis) in a neuropathic child.

These cases are reported because of their interesting relationship to the problem of masturbation as an etiologic factor, and as an

example of how cautiously an examiner should approach this question in eliciting the history of a patient, or giving subsequent advice.

As a rule masturbation is a physiologic event in the life of an adolescent, either wittingly or unwittingly. The normal individual soon finds himself or herself out of the woods of early sexual experiences. The individual who continues the act is neuropathic, the potential victim of neuroses or psychoses. Therefore, if he is to be cured of his habits, he must be approached with an appreciation of his dynamic unbalance. During the last year, at the Educational Clinic at the College of the City of New York and at its branches, I have had occasion to work side by side with men who take account primarily of the physical condition of the truants in the schools of New York City. The majority have been men with an unusual appreciation of the mental needs of these delinquents and have cooperated in an attempt to meet their difficulties with sympathy. On the other hand, in a number of instances the examiner has brutally ferretted out masturbatory habits in the manner of a third degree inquisitor. One expressed himself to me that the only way to drive these "dirty habits" out of the children was by "giving them Hell" (I quote this purposely as indicating the dangerous attitude that can be assumed toward these children). On a number of occasions I have received slips marked, "Hysteria, due to masturbation," "Epilepsy, due to masturbation." Would that some of these examiners might be led to realize the true relationship, the presence of a symptom instead of a cause. We are in an age of dynamic medicine; biologic, psychologic, endocrine, physiologic forces are our problems as related to pathogenesis, and the smallest forces must be approached with respect. Certainly a psychic trauma is not the least of these.

220 Audubon Avenue.

CURRENT NOTES

A Five Million Army Means Fifty Thousand Medical Officers.

With an army of three million men in the field or in training and as contemplated, an expansion of this force to five million men, the Surgeon General must have in the Medical Reserve Corps at least fifty thousand doctors.

The United States is in the war to do her part in winning the struggle and this can only be accomplished by a large and well trained body of troops adequately cared for by sufficient number of medical officers. The importance of the doctor's service and its relation to the successful outcome of the war cannot be underestimated.

As the mobile forces increase in size, so is there an expansion of Base Hospitals and other Institutions for the care of the sick and wounded and there should be no lack of officers when required to give to our patriotic boys that professional attention which is so essential.

It is well for the medical profession of the United States to realize at once that a Medical Reserve Corps of at least 50,000 doctors will be required to meet the demands of the Surgeon General and upon which Corps he can draw for his medical officers.

Physicians' Help Asked to Recruit Nurses—An Appeal from the American Red Cross.

Surgeon General Gorgas has called for 1,000 graduate nurses a week—8,000 by October 1. 25,000 graduate nurses must be in war service by January 1—in the Army Nurse Corps, in the Navy Nurse Corps, in the U. S. Public Health Service in Red Cross war nursing. This involves withdrawal of many nurses from civilian practice and necessitates strict economy in the use of all who remain in the communities.

You can help get these nurses for our sick and wounded men by:

Bringing this need to the attention of nurses.

Relieving nurses where possible wholly or in part from office duty.

Seeing to it that nurses are employed only in cases requiring skilled attendance.

Insisting that nurses be released as soon as need for their professional service is ended.

Seeing that your patients use hospitals instead of monopolizing the entire time of a single nurse.

Encouraging people to employ public health nurses.

Instructing women in the care of the sick.

Inducing high school and college graduates to enter the Army School of Nursing or some other recognized training school for nurses.

Encouraging nurses to go to the front involves real personal sacrifice and added work on the part of the physicians whose duty it is to maintain the health of our civilian second line defense.

But the men who are fighting for their country in France need the nurses.

The Health Officer and the Big Fight.

It is said to take nine men working "over here" to keep one soldier fighting "over there." Clearly, therefore, it is wise to keep the nine workers husky and working as well as the one soldier.

Which health officer should stay at home and who should go to war? How is the nation bearing up under the war strain? What are the special war-time health menaces of the civil population, and what are we going to do about them? What headway are we making against the venereal diseases? These are the questions to be considered at the convention of United States and Canadian sanitarians at Chicago, October 14-17, to be held under the auspices of the American Public Health Association. Some of the military sanitarians who will address the meetings are Surgeon General Gorgas, Colonel Victor C. Vaughan, and Major William H. Welch of the Army Medical Corps. Other speakers at the general sessions will be George H. Vincent, president of the Rockefeller Foundation, Dr. Charles J. Hastings, president of the American Public Health Association, Dr. W. A. Evans, Assistant Surgeon General Allan J. McLaughlin, U. S. P. H. S., Dr. Ernest S. Bishop, Dr. Lee K. Frankel, Dr. Frederick L. Hoffman and others.

There will also be papers upon laboratory, industrial hygiene, vital statistics, food and drugs, sanitary engineering, sociological, and general health administration subjects.

As the health of the civil population has a direct bearing upon the winning of the war, mayors and governors are being requested to send their health officers to the conference in spite of the present high cost of government.

The final program will appear in the American Journal of Public Health appearing September 25th. For further information write to A. W. Hedrich, Secretary, American Public Health Association, 1041 Boylston Street, Boston, Mass.

Financial Aid in Campaign to Stay Spanish Grippe in Switzerland.

One hundred and twenty-five thousand dollars has been appropriated from the Red Cross War Fund to assist the Government of Switzerland in the establishment of hospitals and isolation houses, and undertaking other relief measures, to stay the epidemic of Spanish grippe which has assumed alarming proportions among the Swiss army and civilian population.

The seriousness of the situation, resulting from the spread of this disease among the Swiss people, was reported to the War Council in a cable from Carl P. Dennett, temporary head of the Red Cross Commission to Switzerland.

Mr. Dennett stated that at Fribourg there were 1,500 cases and that twelve deaths had occurred there. From Berne 1,600 cases and thirty-seven deaths were reported. It was stated in the cable that the military authorities were having great difficulty in handling the disease among the soldiers, and that, because immediate action was necessary, a communication has been addressed to Monsieur de Copes, stating that the American Red Cross desires to render every assistance possible, and that if financial help would be acceptable, he would place at the disposal of the Swiss Republic the necessary funds up to 500,000 francs, for the establishment and equipment of special hospitals, isolation camps, or such other measures as are necessary to stamp out the disease.

In a subsequent cable Mr. Dennett reported that the Swiss government had verbally accepted his offer with gratitude, had advised that the epidemic was serious and the help timely, and that as a result of the Red Cross offer of assistance, the government was taking immediate steps to secure hospitals and isolation houses for the military and civilian population.

The War Council took the first opportunity to confirm the action decided upon by the Red Cross representatives in Switzerland by voting the appropriation above stated.

An Experimental Study of the Effects of Ureteral Ligation.

The authors report a patient who had both ureters ligated during a pelvic operation, and who had gone eight days without secreting a drop of urine and before becoming uremic, who had been allowed to go so long on account of the current idea that the cat-gut would loosen and the ureters would open up. A double nephrostomy was done, patient immediately rallied, secreted urine promptly and abundantly. Urine came through the bladder on the fifty-sixth day, both fistulas closed ten days later, and the patient at the end of two years is well.

They then report a series of experiments done on animals, which were conducted to show when catgut absorbs, the manner in which the ureter opens up and if the ureter remains open; also the immediate and remote effects on the kidney. No. 2 plain catgut was never absorbed before three weeks, the ureter never opened until the end of six weeks. By that time the kidneys have been entirely destroyed by hydronephrosis or pyonephrosis. In the kidneys which were drained by nephrotomy and the drain kept in place until the ureter had opened up, the kidney was in good state of preservation. If the kidneys were not effectively drained and were not infected the result was always atrophy; if infected, pyonephrosis. All the ureters from two months to a year that were not associated with bad renal and ureteral infection were opened and some showed very slight evidence of scar. The ureters associated with bad infections showed stricture.

The authors believe that if a kidney can be drained within a few days and kept drained until the ureter opens below that the kidney will be preserved and that there will not be much stricture formation in the ureter. They believe this is the best surgical method to adopt in case of ligation; better than deligation of the ureter, which is almost impossible under such circumstances; also better than ureterovesical anastomosis, and certainly better than allowing the kidney to die without making an attempt to save it.—Drs. John R. Caulk and R. F. Fisher in *Bulletin of the Washington University Medical School*, 1917.

The Function of the Gall-Bladder.

F. C. Mann (of Rochester, Minn.), in a report on an investigation into the function of the gall-bladder, an investigation pursued by comparative anatomic and experimental studies on lower animals, both those with a gall-bladder and those without concludes as follows:

The functional significance of the gall-bladder seems to be intimately connected with the fact that it is mechanically adapted to change the escape of bile into the intestine from a more or less continuous flow into an intermittent one. Studies on animals, practically always dogs, with biliary fistula, show that the liver secretes bile continuously, although the rate varies considerably. In most instances, however, in which duodenal fistulas have been formed, the escape of bile into the intestine has been intermittent. No studies seem to have been made on animals without a gall-bladder in regard to the flow of bile into the intestine, but it seems that, in all probability, it would be continuous with liver secretion. We have observed this in the rat and pocket gopher, but the experiments were complicated by the necessary anesthetic. Under such experimental conditions, the entrance of bile into the intestine in

these two species was continuous, except for the slight changes produced by respiration. The fact that the sphincter seems to be inactive in species without a gall-bladder would imply that this was quite the normal condition. A study of some species of animal without a gall-bladder, in which it is possible to make a permanent duodenal fistula, will be necessary to definitely prove this point.

The action of the gall-bladder seems to be as follows: The liver secretes bile more or less continuously. Under normal conditions this is secreted under very low pressure. The sphincter at the opening of the common bile-duct is normally under tone, which is great enough to increase the intra-duct pressure above the resistance offered to the entrance of bile into the gall-bladder. At intervals the sphincter relaxes, allowing bile to flow into the intestine. The mechanism controlling the action of the sphincter is not known, but is reported to be under nervous control. The gall-bladder not only acts as an expansile chamber for the accomodation of the difference in rate of bile secretions and bile discharge, but it also prevents some of the fluctuations in intra-duct pressure which would occur during respiration, in all instances in which the duodenal sphincter is active. It should be appreciated that in all species in which the sphincter is constantly active some mechanism like the gall-bladder is necessary.

A description of the action of the gall-bladder does not explain its function. Why it should be desirable in some species of animals to allow the bile to enter the duodenum at the same rate as the liver secretion, and in other species, closely related and having practically the same physiologic environment, to have developed a mechanism whereby it pours intermittently into the intestine, is not clear. More investigation will be necessary to eliminate this question. These future researches should include (1) a study of the sphincter in larger series of animals without a gall-bladder and (2) a determination of the mechanism controlling the sphincter in species of animals with a gall-bladder.—*New England Med. and Surg. Jour.*, Aug., 1918.

Formaldehyde-Phenol in Camphor-Paraffin.

Karl Connell of New York describes this new compound antiseptic, which he has worked out and tested clinically at the Roosevelt Hospital and by laboratory tests with the collaboration of Dr. William Esler, Professor of Bacteriology at Cornell. The object he set before himself was to produce an antiseptic of high efficiency and lowered toxicity, which when employed as the first major dressing, together with efficient drainage, at the advance dressing station, would possess such power of diffusion through organic matter and such permanency of bacterial inhibition that the crushed infected tissue may reach the service of the rear in as satisfactory condition as possible.

As many readers of the *INTERSTATE* are engaged in industrial surgery, where such a product should find an extensive and useful application, we are appending the full instructions for the preparation of this antiseptic.

FORMULA.

<i>By weight.</i>	Percent.
Formaldehyde.5
Phenol.	13.5
Camphor.	31.5
Alcohol.	4.5
Paraffin 52° C.	
Paraffin oil.	50

A. To 70 parts by weight of pulverized camphor add 30 parts of phenol, liquefied by heat. A clear solution results.

B. Next melt together paraffin of 52° C., melting point about 3 parts, and paraffin oil 9 parts adjusting the proportions until the mixture frosts on the bulb of a test thermometer at 40° C.

Add 45 parts of A to 50 parts of B. Obtain a solution freezing at 35° C.

C. Prepare 10 percent of formaldehyde in alcohol. Most readily accomplished by adding formalin to alcohol and dehydrating by desiccated sodium sulphate. To 9 parts of AB at 40° C. slowly add 5 parts of C. A clear solution of all ingredients results which freezes and melts at 36° C.

Store in open mouth bottles with paraffined corks or pour directly onto tightly wadded gauze packing for ultimate consumption.

Indications for use of formaldehyde-phenol in camphor paraffin. This preparation is to be used as the first major wound antiseptic in civil surgery and in the surgery of the advance dressing stations. It sterilizes and embalms crushed devitalized wounds for transportation or for long immobilization without redressing.

Method of application. Free surgical drainage should be established. Gauze saturated with the antiseptic should be applied as packing into all clefts and pockets. The interior of the wound should be packed firmly, but the drainage openings should be packed loosely. It should be spread as a sheet on all open wounds and covered with paraffined gauze. (On wounds for primary suture, it should be employed as is tincture of iodine.)

a. *Antiseptic properties.* Phenol and formaldehyde are the only antiseptics possessing power to penetrate blood-clot. In the present combination the toxic properties are within reasonable limits. This combination for subsequent dressings is not as advantageous as the chlorine antiseptics.

b. *Clinical properties.* The powerful penetrating effect of formaldehyde is retained, but severe pain as with aqueous solution is mitigated by solution in phenol-camphor.

The long-continued slow embalming anesthetic action of phenol is retained and that undesirable local toxicity and general absorption of this agent is rendered negligible by solution in an anhydrous favorable menstruum.

The anesthetic effect of the phenol is supplemented by the camphor together with the clean odor and fly repellent properties.

c. *Drainage properties.* The paraffin prevents the blocking of the discharge and allows easy removal of the packing.

d. *Physical properties.* It freezes and melts at 36° C. It stays well in a wound and remains antiseptic in contact with tissue for many days.

e. *Toxicity.* Two ounces by subcutaneous injection is within the lethal limits. Preferably not more than this amount should be employed at any one first dressing.—Surgery, Gynecology and Obstetrics, July, 1918.

Two Statistical Studies on Abortion.

Dr. R. M. Spivy reported to the Washington University Medical Society the results of an analysis of 250 cases of abortion, covering a period of eighteen months' service at the Saint Louis City Hospital.

Over one-third of the 250 women had had previous abortions. Full term pregnancies were less frequent in this group, the ratio of pregnancies to abortions being 1 to 1.04. Four-fifths of the women were married, but in the unmarried the proportion of abortions was greater.

The second and third lunar months were found to include about 60 percent of all abortions, and the writer could confirm Titus' analysis of menstrual

waves occurring at four, eight, twelve, and sixteen weeks from the onset of pregnancy, at which time abortion was more likely to occur.

Special interest attaches to the large percent of confessedly criminal abortions—eighty-four patients, or 33 percent. Of this number sixty-two were self-induced and in only ten instances did the patient acknowledge the assistance of a physician or a midwife. In fifty-two women some instrument had been used to bring on the abortion, the most popular being slippery elm sticks twenty times, catheter ten times, hairpin three times. Fourteen of the women died—26.9 percent.

Bleeding was the most common symptom in the 250 abortions, occurring in 87.2 percent. Only forty-two out of the 250 women were entirely free from fever during their stay at the hospital.

The analysis of the stage of abortion showed threatened abortion 20, incomplete abortion 131, complete abortion 87, uncertain 12. Conservative treatment was employed in 120 women with a mortality of 11.6 percent, and operative treatment in 120 women with a mortality of 6.17 percent. This apparent advantage in operative treatment is however considerably reduced when we eliminate the complicated septic cases. In 222 uncomplicated abortions the mortality in the operative and conservative groups was practically identical, the former showing four deaths out of 118 and the latter four out of 104. The dull curette was employed four times as often as the digital removal with no case of perforation from its use at the hospital. A small group, twenty-one cases, were operated on successfully after the use of intracervical injections of novocain.

The twenty-eight complicated septic cases showed a mortality of 50 percent with a prolonged convalescence in those cases that recovered.

A comparison of the negro and white cases show that while the ratio of pregnancies to abortions was about the same in both groups, the percentage of criminal abortions among the negroes was strikingly small, only two out of thirty-three colored women (6 percent), as compared with eighty-two out of 217 white women (38 percent). This corresponds in the main to Titus' figures.

Eliminating from this study the fifty-three cases of confessedly instrumental criminal abortions with their mortality of 26.9 percent, we find the remaining 198 women with a mortality of only 4 percent.

Dr. G. D. Royston, before the same society, reported on a statistical study of the causes of abortion.

The study of 164 consecutive patients with a history of abortion was carried on as follows:

1. A detailed history was obtained in person.
2. Pelvic examinations were made, frequently under a general anesthetic, and microscopic examinations when necessary.
3. A Wassermann blood test and a functional kidney test with phenolphthalein were made in every case.

The results of these studies were given in the form of tables. The frequency and effects of induced abortion were considered in detail. References from the literature were freely given and the writer flatly denied the claims of Trinchese as to the influence exerted by syphilis on abortion occurring during the first three or four months of gestation. The author shares the view of most obstetricians who hold that clinical evidences are found in less than one-half of the cases of undoubted syphilis in women. He advocates a routine Wassermann reaction on all obstetric-gynecologic patients; nearly one-third of his entire material was syphilitic and in 78.3 percent there was latent syphilis. As a result of the study of his case reports, the author draws the following conclusions:

More than 20 percent, probably over 25 percent, of all abortions are induced. Sixty percent of all induced abortions result in permanent sterility. Abortions induced by midwives, the patient herself and the physician rank in danger in the order named. Married state, church affiliations, the fear of ill health, will not deter a woman once determined to interrupt pregnancy. A positive Wassermann was obtained in 28 percent of all abortions in this series. Less than one-third of syphilitic women give any history of physical signs indicative of the disease. Only by a routine Wassermann test can syphilis in the obstetric-gynecologic patient be detected.

Syphilis interrupts pregnancy at any and all periods of gestation. Syphilitic women abort in more than 60 percent of all their pregnancies. A renal deficiency interrupts pregnancy only in the event of a renal decompensation which is often amenable to treatment. Pregnancy may be interrupted as a result of renal deficiency at any period of gestation. Extragenital factors can produce abortion and must be investigated if subsequent interruptions of pregnancy are to be prevented. Sixty-five to 90 percent of all women who have aborted will show some pathologic lesion in the pelvis.

A poor state of nutrition influencing an interruption of pregnancy is usually secondary to a more important underlying condition, as syphilis, impairment of the heart, lungs, or kidneys.—From Bulletin of the Washington University Medical School, 1917.

Bile Tract Surgery.

Before the Chicago Surgical Society, Dean Bevan reviewed this subject. In a retrospective survey he quoted Keen and Musser (1884) as follows: "After revising these 85 cases we are very much surprised and gratified at the low mortality from these operations, the mortality being only 30 percent." The progress made since that time probably in the same series of cases would today give a mortality of 3 to 5 percent. In 1898, in the Chicago Medical Society, was presented a symposium on this subject in which the following men took part: Fenger, Senn, Billings, Hektoen, Herrick, McArthur, and Bevan. Dean Bevan lately reviewed that symposium and was surprised to find how completely it represents the present knowledge on this subject. The advances made in the last 20 years have been principally in the way of refinements in technique, and because of the experience gained in an enormous number of cases, our ability to make more accurate diagnoses, to decide for or against operative procedures and to better select the particular plan of treatment indicated in a particular case has been enhanced. In addition, the one special improvement which has been made in this field has been in plastic surgery for the restoration of the common duct.

As a result of investigations at the Presbyterian Hospital in Chicago, the surgeons have learned to attach diagnostic importance to the following points, given in order of merit: 1. History. 2. Elimination of simulating conditions. 3. The theory of probabilities. 4. Physical examination. 5. Laboratory tests. 6. X-rays.

Eighty percent, or more, of the total value of the evidence used in making a diagnosis has come from accurate study of the history of the case.

As an illustration of the calculation of probabilities, when a boy of 15 has an acute abdominal attack resembling in its clinical picture a gall-stone attack or an acute infection of the gall-bladder, we are inclined to regard it more as an appendiceal lesion situated high up in the abdomen than as a lesion of the gall-bladder. On the other hand, when the same picture occurs in a woman of 35 who has had children, on the theory of probabilities, we are more apt to regard the case as gall-stones or infection of the bile tracts; and again

in a man of 55 with the clinical picture suggestive of bile-tract lesion we take into consideration also the possibility of carcinoma. Again in a man of 25 or 30 in whose case the differential diagnosis is difficult, it was found, in the majority of cases, that there was a duodenal ulcer, while in a woman of 40, with the same picture probabilities point to gall-stones.

In regard to x-rays Bevan attaches little importance to them in this connection. In a few cases the x-ray picture affords positive evidence of gall-stones, and this is valuable. But in most cases they are of no assistance, even when not misleading. In the subsequent discussion Dr. L. L. McArthur strongly supported this position of the essayist saying: "In regard to x-ray pictures of gall-stones, I agree with Dr. Bevan that the claim of the roentgenologist that 30 to 50 percent of stones are demonstrable by the x-ray is excessive. Of five cases in the last three or four years that have been turned over to me as gall-stones demonstrable by the x-ray, in three of them gall-stones were not found in the gall-bladder. In one of them there was a stone in the kidney, in the other two there were calcareous glands, one with the gland situated at the junction of the cystic with the common duct, which so frequently enlarges with ordinary gall-bladder disease, with typical calcareous degeneration, and in the other case there were two smaller glands, retroperitoneal."

Bevan's account of the locating of diagnosed stones, as reported in Surgery, Gynecology, and Obstetrics, is a little obscure in some parts. We therefore quote it literally: "We rely in gall-stone cases, as far as locating the position of the stones, on the well-known and accepted evidence that *when the stones are limited to the gall-bladder, we have neither enlargement of the gall-bladder nor jaundice*; with obstruction of the cystic duct, enlargement of the gall-bladder; with obstruction of the hepatic or common ducts, jaundice, either intermittent or progressive determined by the condition of the stone, whether it is a floating stone or impacted. *When jaundice is present we know that it is not due to a stone in the hepatic or common duct but to a stone in the gall-bladder* with associated cholangitis, and we recognize also that when jaundice is present it may be due not only to gall-stones and cholangitis but to a number of other conditions; the jaundice of scirrhus, the jaundice due to obstruction from carcinoma of the pancreas or carcinoma of the bile tracts themselves, the jaundice of syphilis involving the liver or the bile tracts. On the whole we have learned to respect the Courvoisier law that in jaundice from gall-stones in the common duct the gall-bladder is contracted in 80 percent of the cases and that in jaundice from carcinoma of the pancreas obstructing the duct the gall-bladder is dilated in 80 percent of the cases.

(The italics are ours.)

A great deal has been learned in the last 10 years about the relationship between bile-tract lesions and lesions of the pancreas. In a large number of cases even at the time of operation it was difficult to determine the exact character of the pancreatic lesions; whether they were inflammatory or carcinomatous. In a differential diagnosis between gall-stone disease and carcinoma the intermittency of the jaundice or the intermittency of the appearance of bile in the urine in gall-stone disease as compared with the greater persistence in carcinoma has been evident in most of our cases.

In a number of cases where evidence pointed to lesions about the bile tracts, at operation no such lesion was found nor yet anything in the immediate neighborhood, such as a duodenal ulcer, which might explain the clinical condition.

Bevan and his colleagues require very definite evidence of an organic lesion before draining or removing the gall-bladder in such a case. They have given up draining these gall-bladders as they have never seen any benefit result from draining them, and they never remove these gall-bladders as they do not recognize such a thing as a strawberry gall-bladder which of itself demands

removal. The surgeon or internist has diagnosed gall-stones or an infected gall-bladder and when he finds no gross evidence of either he usually removes the appendix and drains or removes the gall-bladder. There is no more reason for removing such gall-bladders or draining them than there is for draining or removing a kidney which is the site of a mild pyelitis with a patulous unobstructed ureter. In mild gall-bladder infections with unobstructive gall-duct and without pus or gall-stones the process is curable quite as well by a drainage through the normal ducts as by external drainage through a rubber tube, and the real facts are that most of the cases in which the gall-bladder is removed or drained are cases of mistaken diagnosis and not infected gall-bladder at all. They do not recognize the necessity for surgical interference in the so-called chronic and subacute infections of the gall-bladder where there is no gross organic change evident in the gall-bladder itself, and where there is no obstruction of the cystic duct as shown by the fact that the gall-bladder can be easily emptied. On this point, of leaving unopened a gall-bladder, which appears normal externally or in which there are no objective signs of disease, Dr. Wyllys Andrews took issue against the essayist at the discussion.

As to time of operation, if the absence of menacing symptoms suggestive of severe acute infection with the possibility of gangrene and rupture, permits of a choice, the prognosis is better if the operation be performed between attacks.

As to the decision to operate or not to operate, the question has come to be decided in a less routine manner, and more on a careful consideration of the particular case.

The close association of internist and surgeon has borne fruit in increased accuracy of diagnosis. The internist's diagnosis and anatomical description have proved accurate in 80 percent of cases.

Surgical Therapy.—Almost all operations at the Presbyterian Hospital are now either cholecystectomies or choledochotomies. Cholecystotomies are rare and limited to three classes of cases—to cases where the gall-bladder is little diseased, and without cystic duct involvement, to those which are poor surgical risks, and to those done under local anesthesia. Cholecystenterostomy has been practically abandoned.

Next to gall-stones and acute infections, carcinoma has been the most frequent cause of bile-tract symptoms, and surgical interference is warranted. Carcinoma of the pancreas and stomach with resulting jaundice has in these cases been the most frequent finding at the exploratory operation. Here the silent course, the persistent jaundice and the distended gall-bladder form the typical picture, but the pictures are sometimes confusing and not infrequently the course is not silent but associated with a severe colic attack. The jaundice may be intermittent and the gall-bladder may be contracted simulating clinically the typical picture of obstruction of the common duct by stone.

Again in this same clinical group must be placed a good many cases of chronic pancreatitis presenting symptoms which often before the operation cannot be differentiated from carcinoma or gall-stone disease. Where obstruction of the common duct from carcinoma or chronic inflammation of the pancreas is found, the indication is either a cholecystenterostomy or a cholecystostomy. In a surprising number of cases the process is not carcinoma but inflammatory, and the patient recovers permanently with the establishment of drainage.

In syphilis, which is next in frequency as a cause of bile tract disease, as a rule, a clinical diagnosis is made without resort to an exploratory incision.

After a passing reference to plastic repair of the hepatic and common ducts, the essayist closed his address by a redescription of his large S-shaped incision. —Abstracted from *Surgery, Gynecology, and Obstetrics*, July, 1918.

Linum Truly Usitatissimum.

Difficulties in connection with the supply of cream for infant feeding have created a great demand for substitute fats, and an enormous quantity of specially prepared emulsion of linseed oil, known popularly as "Marylebone cream," has been supplied to welfare centers. Unfortunately, the supply of linseed oil available for this purpose is rapidly becoming exhausted. We understand, however, that one at least of the large wholesale firms which supply Marylebone cream has made application to the food controller for the release of a sufficient quantity of this oil to satisfy the requirements of welfare centers, urging as a plea that its use for this purpose is of national importance. We hope that the Ministry of Food will take a favorable view of the application, as deprivation of a physiological supply of fat is a serious cause of malnutrition among the infants of the poorer classes, and linseed oil is one of the cheapest forms in which fat can be supplied, while experience goes to prove that it gives excellent results when used judiciously.—*The Lancet*, July 6, 1918.

Internal Secretion as a Factor in the Origin of Cancer.

Carcinoma of the mammary gland in females is the typical cancer in mice. It is possible to reduce the incidence of spontaneous cancer in these animals from 60 to 70 percent to 9 percent through castration at the age of 4 to 6 months. The age at which cancer occurs is increased in castrated animals. If mice are prevented from breeding, the cancer rate is slightly diminished and the cancer appears later in life.

In the ovaries a substance (internal secretion) is produced, which stimulates the growth of the mammary gland. The elimination of this substance reduces very much the liability to cancer, even in animals hereditarily predisposed to cancer. Prevention of breeding reduces somewhat the quantity of substance produced by the ovary and thus reduces slightly the liability to cancer—Dr. Leo Loeb, in *Bulletin of the Washington University Medical School*, 1917.

Unsafe Distilled Water Ice.

The profession, equally with the public, is likely to place confidence in the safety of ice made from distilled water. A note of warning is sounded by W. L. Dodd, who in the course of a survey made for the Metropolitan Life Insurance Company, discovered that this confidence may sometimes be misplaced.

When ice is made by the can process, after the block is made, it must be superficially thawed to loosen it from the walls of the container. This is effected by hosing the latter with warm, not hot, water. Some of this water will inevitably enter the can and in most instances will remain there in part, to be mixed with the next lot of distilled water. When the thawing water is suspect, as in the case described by Dodd, the distillation of the main bulk of the water will not suffice to exclude contamination.—Abstract from *The American Journal of Public Health*, August, 1918.

Sour Milk Kills Typhoid Bacilli.

In reporting an investigation made in the laboratories of the Rockefeller Institute, Penelope Marsh concludes: *B. typhosus* is sensitive to acidity and is usually destroyed in milk in a short time at about the degree of acidity occurring in fresh buttermilk as obtained in the New York market. Buttermilk would seem to be free of danger as a means of distributing *B. typhosus* or *paratyphosus*, or *B. dysenteriae* in the ordinary course of events.—*The American Journal of Public Health*, August, 1918.

BOOK REVIEWS.

MILITARY SURGERY OF THE ZONE OF THE ADVANCE. (MEDICAL WAR MANUAL No. 7). By George de Tarnowsky, M.D., F.A.C.S., Surgeon to Cook County and Ravenswood Hospitals, Chicago; Major, M.C., U.S.R., American Expeditionary Force, France, 1917-1918. Illustrated. Philadelphia and New York: Lea & Febiger, 1918, \$1.50.

This manual of 330 pages is authorized by the Secretary of War and issued under the supervision of the Surgeon-General and the Council of National Defense. Few of the innumerable war surgery manuals which have come into our hands are so full of interest and of real meat. Naturally this work is to quite a large extent a compilation. But in the act of compiling, in the choice of material, the author has been guided by his own first-hand experience.

Those parts which do not come under this head are of an interest which it is almost possible to call fascinating.

The earlier part of the work contains a first-hand description of the French and of the British zones of the advance. In each case the author makes a point of describing not merely the technically important practices which he witnessed, but also the terrain, the weather, and the other elements of the environment which count for so much in determining the choice of methods and system. In particular, and in illustration, he attributes the fact that the British do not practice primary suture in the most advanced stations, not to conservatism, but to the greater difficulty of the line they hold and the constancy of the activity on their sectors.

Describing the part he visited, Dr. de Tarnowsky says: "For miles in every direction there is hardly a square yard which is not represented by a shell hole, full to the brim of muddy water. . . . Roads are either under constant shell fire or have been entirely destroyed, and consequently all movements of troops as well as evacuation of wounded take place along the 'duck-board' paths driven in the mud. . . . It is impossible to conceive of a more stupendous task than the one confronting our allies in this sector. It is unbelievable until one has actually visited it; it is impossible to describe its horrors."

After a description, a comparison, and a contrast of the two zones, Dr. de Tarnowsky deals in detail and yet in a style as compendious as interesting with the separate surgical questions presented. He quotes much from official regulations, which gives his teaching a definiteness that is of high present value. After the general subjects, such as shock, hemorrhage, wounds of soft tissues, he takes specific problems regionally.

There is a long, detailed, and copiously illustrated chapter on roentgenology of war wounds and the work closes with a description of the Carrel-Dakin technic. In this connection we note that he recommends this treatment for gas gangrene, but the language suggests that he is doing so as a habitual formula and has not taken into account the fact that many observers have found the gas bacillus to have a complete contempt for hypochlorites, though highly sensitive to other agents, particularly solutions of quinine hydrochloride.

This manual, of really pocket size, is of the highest merit, and should nowadays be in the possession of every physician who may by any possibility be sent to the front.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

OCTOBER, 1918.

No. 10

EDITORIAL.

EDUCATION.

In the early part of the war the Ministers of State in England attempted to deal, executively, legislatively, and rhetorically, with a number of scientific matters on which they were woefully ignorant.

A memorable example was that of Sir John Simon, then Solicitor-General, who, in dealing with some blockade question relating to the supply of fats to Germany, stated that the Germans, "with their wonderful technical skill," had found a way of making glycerin from fats and oils!

Later an order (soon canceled) was issued that parcels for prisoners in Germany were not to be packed in "tin" boxes. There can be little doubt that the author of that order imagined that "tin" and "tinplate" were the same.

The first result of such ridiculous blunders was the placing of responsibility for such matters in the hands of experts. The second consequence was a stirring of the public conscience on the general question of the teaching of science. "The Government adopted the traditional method of poulticing the sore place in public opinion by the appointment of two committees,"¹ one on the position of natural science in the educational system, the other on the teaching of modern languages.

The president of the former was Sir J. J. Thomson, P.R.S., probably the greatest living physicist, and the membership was composed of representatives of secondary, university, professional, and technical education. The committee reported in February, 1918. Much of its report deals with aspects of the question peculiar to the United Kingdom, but it contains matter that interests us. An illuminating comment on the recommendations is contained in Professor Starling's article quoted.

The majority of those whose ludicrous blunders occasioned the

¹Starling, E. H. (*The Lancet*, Sept. 14, 1918).

appointment of this committee were educated in the great public schools, such as Eton, Harrow, and Rugby.

In this connection Starling remarks: "It is the office of education, therefore, to prepare the young for their future work by placing at their disposal such a summary and collection of the total human experience as are essential for making them efficient members of the community. All this would seem self-evident; but it does not represent the guiding principle in our education, nor is it often thought of in our public school system, although parents will make considerable sacrifices in order that they may send their boys to public schools. Nothing can be more foolish than to assume that all men are fools. Men send their sons to public schools because there are some advantages which more than outweigh under present conditions the disadvantages of a senseless method of education. It has often been stated that a boy goes to a public school because he receives there the education of a gentleman. It may be objected that this is mere snobbery, but, at any rate, if, as Frenchmen allege, "*le snobisme*" is the ruling principle of our organization, it must be to the benefit of the newcomer into the organization to conform to its principles.

For, however the fact may be camouflaged in leading articles and election addresses, feudalism is ingrained deeply in our constitution. The ruling classes have resisted destruction of the system by the tactful absorption of newcomers and possible rivals, so that town and country alike are still scattered with baronial castles, where the inmates, fortified by possession of birth or capital, take toll of the community. And those who cannot enter into this class have devised a method for the avoidance of over-much exploitation—namely, for the formation of guilds and associations for mutual protection and benefit. In this country, therefore, it is of the highest advantage for his worldly success that a man belong either to the ruling class, as member or retainer, or to a guild of some sort or other; and this is much more important and has a bigger influence on the welfare of the individual than any sort of education he may receive. If the boy is expected to make a career and to obtain posts (apart from the limited number which are offered as a result of a competitive examination in the dry bones of his school curriculum), his success will depend more on what he is or to what guild he belongs than on his intellectual equipment.

It is, indeed, regarded almost as a heresy to demand of a Minister special knowledge of the work which he is appointed to direct, and the idea of promotion by merit in the army or other public services arouses a feeling of horror in the majority of those belonging to these services."

Here we encounter a difficulty of language. We have no expression, except "gentleman" and "well-bred," both of which are

equivocal, to express what the French call a man of education. In French one makes a sharp distinction between learning (*instruction*) and *éducation*. It is *éducation*, not *instruction*, that a boy receives at an English public school.

Great stress is laid, in the report, on proper training in English. Without appreciation of language, clearness of thought is impossible. We have in English the richest vocabulary in the Western World. Yet, as a distinguished philologist once remarked to me, "You English are like a banker who has hoards of gold, but who does business only in pennies."

The learned physiologist, in concluding, expresses a thought which many of us have had:

"The Committee remarks that the war has not only hampered their inquiry, but must sadly retard the realization of their hopes. This is surely a somewhat pessimistic attitude. If the war has done nothing else, it has shown us that in matters of urgent necessity it is unprofitable to count the cost. How many millions have been spent on our new tactical weapon, tanks? Forty millions (\$200,000,000) a year is given as a subsidy to keep down the price of bread. An expenditure of money equal to that devoted at the present time to the provision of gas masks for the army would cover all the needs of education for many years to come. If only the conviction can be brought home to the nation of the urgent need of educational reform, or even revolution, for the maintenance of our place in the world, all that are required on the part of our administrators are a clear idea of the reforms necessary and courage to carry them out."

DIPHTHERIA CARRIERS.

Readers of the INTERSTATE are familiar with the gospel preached by Dr. D. M. Lewis of New Haven, of which a new chapter is published in this issue. Dr. Lewis fired the first gun of his drive on the conventional views of epidemiological activities, in the prevention of contagious disease, in an article published in *The Journal of the American Medical Association* in 1916. The subject of that paper was the control of diphtheria. His views may, in this connection, be summarized as looking on the fieldwork as of cardinal importance, and the laboratory work as invaluable for indication and for confirmation, but secondary in deciding the release from quarantine. A second and corollary doctrine is that persons once cases (or carriers?) should be kept under observation for nasopharyngeal catarrh, and that this personal and neighborhood fieldwork should be intensified at "catarrhal" seasons.

Dr. Lewis's arguments appear, to the impartial critic, to carry

much weight, and they are certainly supported by the epidemiologic returns of New Haven.

Nevertheless we find no trace of their influence in the most recent contribution to this subject—a report on epidemiologic work in diphtheria at Fort Sill.¹

“The carrier condition,” say our present authors, “can only be determined by means of cultures.” They then go on to show that cultures—negative cultures—are fallacious. Nor can this be said only of single negative cultures, though the opening sentence of the following quotation and the first italicized expression might lead one to suppose so:

“A single negative culture has but little value, as is proved by these figures: of 294 cases in which tonsillectomy was performed for the relief of the carrier state, cultures taken from the tonsils immediately preceding the operation yielded positive results in 57 percent of the cases, and negative results in 43 percent. Cultures of the tonsils after removal gave positive results in 77.2 percent of the cases. The fact that negative cultures were obtained in 22.8 percent of individuals in whom the carrier condition had been definitely proved emphasizes the necessity for caution *in over-estimating the value of a single negative culture*. In a number of instances a pure culture of *B. diphtheriae* was obtained from tonsils removed from patients who had not been identified as carriers. But these patients had had the disease from four to fourteen weeks previous to admission and *had been released on the required number of negative cultures*. As is well known, negative cultures may be obtained at times from cases that run the course of typical clinical diphtheria.”

The second italicized passage gives the position away completely.

From later parts of the report we cull the following:

“In a few cases the bacilli were found in the discharge from acute and chronic suppurative processes of the middle ear.”

“The most persistent nasal carriers are those in whom chronic inflammatory or atrophic processes are found. It is almost impossible, in view of the varying culture returns, to state when the condition has finally cleared.”

“In nasal carriers the cessation of the carrier state takes place on the disappearance of the accompanying pathologic condition; therefore, efforts must be directed toward the improvement of the underlying condition.”

On the whole the impression that one carries away from the reading of this report is that the writers “have eyes and perceive not,” and that the presence of an epidemiologist, with an open mind and some knowledge of Lewis’ work, even if not a thick-and-thin

¹Keefer, F. R., Friedberg, Stanton A., and Aronson, Joseph A.: A Study of Diphtheria Carriers in a Military Camp (Jour. Amer. Med. Assn., Oct. 12, 1918).

supporter of the Connecticut epidemiologist, might serve to clear up and solve many difficult problems of camp hygiene.

THE CAUSE, COURSE, AND TREATMENT OF SPANISH INFLUENZA.

Is the present epidemic etiologically similar with that of 1889?

In direct contradiction with the negative results of some of the greatest of bacteriologists quoted in Current Notes in this issue comes the experience of Staehelin of Basle, quoted in the *Medical Record* of September 21, from the *Correspondenz-Blatt fuer Schweizer Aerzte*.

According to Staehelin, Pfeiffer's bacillus was found in the sputum and blood of patients in the Basle City Hospital. The clinical course was identical with that of the pandemic influenza of 1889, though a higher incidence of pneumonia in young patients was observed. Fifty percent of the population were attacked and the mortality was one percent, so that 5 per 1,000 of the inhabitants died.

It is difficult to believe that such men as Kolle and Pfeiffer himself could miss Pfeiffer's bacillus in a number of cases in which it was present as the principal etiologic agent. With regard to treatment, Staehelin lays great stress on immediate action in the way of confinement to bed. The rest is expectant except that salicylic preparations are especially useful. He prefers salicin, but commends also salipyrin, while warning against excessive use of antipyrin.

"NAME THE DUCTLESS GLANDS AND STATE WHAT IS THE SECRETION OF EACH."

This is an examination question—all can see that. But how many can guess at what kind of examination this was set? At some final test for a Doctorate of Science or Philosophy in Biochemistry? In one of those supreme competitive tests for the position of *agrégé* at the Faculty of Medicine of Paris? No. The question quoted above was recently set to the *nurses* sitting for their state examination in an eastern state. *And it was a compulsory question!*

Who can answer it? Perhaps no one. But there is one person of whom it is perfectly safe to affirm that he could not come within miles of doing so, and that is the person who set it—otherwise he would not have set it.

EDITORIAL COMMENT.

In this issue we publish the first part of a collective abstract by Dr. Jacob Rosenbloom, dealing with the laboratory diagnosis of

endocrinopathies. The second part will give an account of dys-pituitarism.

It was Dr. Rosenbloom's intention to work this matter up into a collective abstract with critical comment. The exigencies of the present time have prevented this, and, rather than wait indefinitely, it has been thought better to publish the notes in their present form, hoping at some future time to be enabled to give our readers Dr. Rosenbloom's personal appreciation on the subject.

We have before us the program of the convention of the American Public Health Association, to be held in Chicago during this month. It promises the usual number of papers on such subjects as the counting of flies in the ointment, and the fractional separation of the products of the destructive distillation of chop suey. But apart from these side issues, which could perhaps not be side-tracked, the program does hold forth prospects of serious discussion of subjects of urgent interest and of special suitability for treatment at a congress.

In particular we shall have an opportunity of hearing the Public Health Service's War Program explained. It is to be hoped that it will include an after-the-war program. Not only is this suggested by the peace movement now on foot, but it is called for by the priceless and unrepeatable opportunity of catching competent, trained men to carry on State and Preventive Medicine, who otherwise will drop back into the therapeutic ranks of the profession.

COLLECTIVE ABSTRACTS

FUNCTIONAL METHODS FOR STUDYING DISEASED CONDITIONS OF CERTAIN INTERNAL SECRETORY ORGANS (THE ENDOCRINOPATHIES).

By JACOB ROSENBLOOM, M.D., Ph.D., Pittsburgh, Pa.

I. INTRODUCTION.

It is customary to include as endocrine or internal secretory organs the following: (1) the thyroid gland, (2) the hypophysis cerebri or pituitary body, (3) the chromaffin tissues, including the medulla of the suprarenals, (4) the interrenal system represented in man by the cortex of the suprarenals, (5) the parathyroid glands, (6) the genital glands or gonads (testes and ovaries), (7) the thymus gland, (8) the epiphysis cerebri or pineal gland, and (9) certain portions of the pancreas.

The importance of having methods at our command to detect diseased states of these glands is apparent to anyone. This paper contains a list of those methods that may in time prove to be of great use.

Hyperthyroidism Tests.

II. METHODS FOR STUDYING THE FUNCTION OF THE THYROID GLAND.

(a). Metabolism Studies as a Test for Hyperthyroidism.

It has long been known that there exists a markedly augmented katabolism in cases of hyperthyroidism.¹ The respiratory interchange shows an increase of 50 percent., 70 or 80 percent. in the amount of oxygen consumed.²

Du Bois³ has found that the increase in metabolism is strictly proportional to the severity of the clinical symptoms.

Kraus was the first to suggest that determinations of the respiratory metabolism by the use of the Zuntz-Geppert apparatus might be of service in the diagnosis of latent or evident hyperthyroidism. Experiments made in the Pettenkofer-Voit apparatus have also shown the marked increase in the respiratory metabolism in hyperthyroidism.

As regards the method to be used for clinical studies, the only ones that are practical are those of (1) Zuntz-Geppert, of (2) Jaquet and Grafe, and (3) of Benedict. In the Zuntz-Geppert apparatus the gas exchange of the lungs only is measured; that of the skin is neglected.

The development of apparatus for measuring the respiratory exchange of man has proceeded along two lines. In one type the subject is completely enclosed in a chamber; in the other, the subject is attached to the respiration apparatus by means of some breathing appliance. The chamber type includes the respiration apparatus of Pettenkofer and Voit,⁷ Souden and Tigerstedt,⁸ Jaquet,⁹ and Grafe,¹⁰ the Atwaters-Benedict¹¹ respiration calorimeter and the apparatus of the Nutrition Laboratory.¹² The open-circuit apparatus are represented by the apparatus of Speck,¹³ Zuntz-Geppert,¹⁴ Tissot,¹⁵ and

Douglas.¹⁶ The closed-circuit apparatus include the two types of the Benedict apparatus,¹⁷ Rolly's¹⁸ modified Benedict apparatus and that of Krogh.¹⁹

The respiration colorimeter used at Bellevue Hospital has been described by Lusk²⁰ and by Riche and Soderstrom.²¹

THE CLINICAL RESPIRATION APPARATUS OF BENEDICT.²²

The clinical respiration apparatus in its finished form consists of: (1) a respiration chamber, suitably illuminated and ventilated, in which the subject may lie comfortably upon a cot; (2) a universal respiration apparatus with a rotary blower for ventilating the chamber, an absorbing system for purifying the air of carbon dioxide and water, and a suitable oxygen supply; (3) accessory apparatus in the form of thermometers, a barometer, and apparatus for recording the pulse-rate and the degree of muscular repose.

In this description of the clinical respiration apparatus condensed from the authors cited, it is advantageous to consider first the universal respiration apparatus

THE UNIVERSAL RESPIRATION APPARATUS.

The universal respiration apparatus, which was developed in the Nutrition Laboratory at Boston, has been used in a considerable number of researches. In principle the respiration apparatus is designed to supply the chamber with a moving volume of air, absorb the carbon dioxide in the outcoming air, replace the oxygen consumed by the subject, and return the air again to the chamber with a chemical composition not materially unlike that of atmospheric air.

In the process of purification the carbon dioxide in the air is completely absorbed, the amount excreted by the subject being determined by the increase in weight of the absorbing vessels. Thus gas analyses with their attendant difficulties of technic, are unnecessary. The oxygen consumption is quantitatively determined directly by noting the amount it is necessary to introduce into the respiration chamber in order to secure the same volume of air in the chamber at the beginning and end of the experiment, due allowance being made for changes in temperature, pressure, and volume of water vapor.

The air, as it leaves the chamber, contains the carbon dioxide and water given off by the subject and is also deficient in oxygen, owing to the oxygen required for combustion in the subject's body. The outcoming air is forced by a positive rotary blower into the absorbing system and passes first into an empty glass Williams bottle, which serves as a trap to prevent any back suction of acid in case of an accident. The air then passes into a large Williams bottle, containing concentrated sulphuric acid, and from there into a smaller Williams bottle, also filled with acid, which acts as a control. The water vapor is thus completely removed, but the carbon dioxide still remains. The air now reaches a valve by which it passes into either one of two sets of purifying systems, consisting of soda-lime and sulphuric-acid bottles. The carbon dioxide is completely absorbed by the soda-lime, and the water given off by the moist soda-lime is also removed by the sulphuric acid in the second vessel.

After the air leaves the carbon dioxide absorbing system through the valve, it passes through a can containing sodium bicarbonate to remove the small unweighable traces of acid vapor, which might otherwise irritate the nose and throat of the subject, and then continues into the respiration chamber.

Theoretically, oxygen may be admitted at almost any point in the air circuit; it is conveniently introduced from a large cylinder through a meter at a point in the pipe, connecting the spirometer or tension-equalizer with the chamber. Variations in the volume of the air in the chamber are corrected by means of this spirometer. In describing the various parts of the universal

respiration apparatus more in detail, it seems desirable to follow the course of the ventilating current.

Blower.—The most satisfactory is a positive blower in a surrounding iron box which is suitable for an oil immersion bath. By it the air, withdrawn from the chamber, may be forced through a considerable number of layers of sulphuric acid and soda-lime contained in suitable vessels. The speed of the blower may easily be altered by a simple lamp resistance, these blowers usually giving a suitable ventilation—not far from 35 liters per minute—when rotating at the speed of 270 revolutions per minute.

Acid Trap.—To prevent the possibility of drawing back strong sulphuric acid into the delicate mechanism of the blower, an empty glass bottle is inserted in the system. While almost any form of bottle can be used for this purpose, it has been convenient for us to employ an empty reversed Williams bottle.

Water Absorbers.—The air leaving the respiration chamber contains a large amount of water vapor from the lungs and skin of the subject. Before the carbon dioxide produced by the patient is absorbed, it is important to remove this water vapor entirely from the air. The current is therefore first passed through two or more bottles containing sulphuric acid. Usually one large-sized Williams bottle is sufficient to collect nearly all of the moisture, but this is followed by a second bottle, which retains the last traces of water vapor. To facilitate handling and to prevent breakage, each bottle is usually inclosed in a small wire basket with a handle, by means of which it may be suspended directly from a hook on the arm of the balance.

Tubing and Piping.—The Williams bottles, as well as the soda-lime bottles for absorbing the carbon dioxide, are fitted with short lengths of rubber tubing of good quality, to which are attached respectively male and female parts of ordinary garden hose couplings of the standard $\frac{3}{4}$ -inch size (approximately 16 mm. internal diameter). The couplings are, therefore, interchangeable with different forms of apparatus. With a standard rubber hose gasket, the couplings can be made air-tight by a simple twist of the hand. All of the piping throughout the apparatus is of standard $\frac{1}{2}$ -inch (16 mm. internal diameter) pipe.

Two-way Valve.—In order to deflect the main air current from one set of purifiers to the other, it is necessary to have a two-way valve. The valves are of this type. A long steel rod connects the two valves in such a way that by throwing the handle at one valve, both are simultaneously turned and the air current instantly deflected from one set of purifiers to the other.

Carbon Dioxide Absorbing System.—The most effective absorbent for carbon dioxide is slightly moist soda-lime. The soda-lime containers are wide-mouthed glass bottles. Each bottle contains 2 kilograms of soda-lime, capable of absorbing not less than 75 grams of carbon dioxide, and weighs, when filled, about 4 kilograms. The dry air in passing through the moist soda-lime absorbs moisture, and it must, therefore, be dried again, which is done by passing it through the Williams bottle.

It is possible that the amount of water vapor given up by absorbers to the dry air passing through it may be actually more than the amount of carbon dioxide absorbed, so that the bottle may lose in weight. On the other hand, the water vapor given up is immediately absorbed by and hence the algebraic sum of the weight of the two bottles gives the weight of the carbon dioxide absorbed.

The moisture in the soda-lime is essential to the efficiency of the absorbent. The amount of water absorbed by the air current from the soda-lime and collected in the Williams bottle may be determined by weighing the Williams bottle separately. If the soda-lime is remoistened with the same amount of water that has been lost, the absorbent may be considerably regenerated.

It has been found practicable to add the water through a funnel inserted in the intake of the soda-lime bottle at the end of each day's experimentation. By the next morning the experiment can be carried on as usual.

Although moist soda-lime is a most efficient absorber of carbon dioxide, yet it has been thought desirable to test the completeness of absorption by the insertion of a small flask containing a solution of barium hydroxide, in such a manner that, by opening the pet-cock, a portion of the air from which the carbon dioxide has presumably been absorbed may be deflected through the barium hydroxide solution, where the slightest trace of carbon dioxide is indicated by a turbidity.

As the amount of carbon dioxide given off by the subject is determined by noting the increase in weight of the soda-lime vessels with its attendant Williams bottle, the degree of absolute moisture in the air when it enters the soda-lime bottle and leaves the Williams bottle should be identical. If the routine with the Williams and the soda-lime bottles is properly carried out, no difficulty is experienced, but it is advantageous occasionally to test the efficiency of the apparatus for absorbing carbon dioxide and water vapor. Consequently, in blank tests—i. e., with the apparatus in operation, but with no subject inside—it is advisable to weigh the sulphuric acid and soda-lime vessels separately, and continue passing the air through the system for a half hour. Under these conditions, the loss in weight of the soda-lime vessel should, of course, be exactly counterbalanced by the increase in weight of the accompanying Williams bottle.

Sodium-Bicarbonate Can.—In order to absorb the unweighable traces of acid fumes which may remain in the air after it has been carried through the Williams bottles, it is necessary to insert in the air circuit a small can filled with dry sodium bicarbonate and cotton batting. This completely removes the acid fumes and does not affect the determination of the carbon dioxide or of the oxygen in any way. The sodium bicarbonate does not need frequent renewal, the amount used remaining efficient for approximately a year's experimenting.

Oxygen Supply.—The point at which the oxygen is introduced may, of course, be varied according to the conditions under which the apparatus is to be used. The direct determination of the amount of oxygen absorbed by the subject may be made either by introducing it from a small cylinder of the gas and noting the loss in weight during the experiment, or by passing the oxygen through an exceedingly delicate and accurate gas meter. Small cylinders of compressed oxygen, which can be readily weighed, may be secured from the Linde Air Products Company of Buffalo, N. Y. These cylinders weigh when filled, about 3 kilograms, and contain about 150 grams of oxygen with a purity of about 98 percent.

One of the greatest difficulties in using these cylinders has been the selection of a suitable valve, that furnished on the cylinder by the manufacturer being difficult to utilize, owing to the high pressure under which these cylinders are filled. Formerly recourse was had to one of the numerous types of reduction valves, but a thorough test of these showed no valve which would functionate properly for a long period. One or two types of needle valves have been found which are much less expensive, and give a satisfactory closure. Such a needle valve is coupled to the exit of the cylinder, then closed, and the main valve on the cylinder is opened to its fullest extent. The issuing gas may then be very delicately regulated by means of the needle valve. With so high a pressure it is obvious that the packing around the main valve stem should be excellent so as to give no opportunity for leakage of air. The valves may be tested by immersing the cylinder and valve in water or by weighing the cylinder

carefully on a balance, and then again an hour later; any loss of oxygen between the two weighings will be instantly apparent.

Extended experience in respiration experiments has shown that the respiratory exchange is absolutely unaffected by increased oxygen percentages and even by the respiration of pure oxygen, but if the oxygen percentage is lowered to 11 or 12 percent, respiratory disturbances are apt to appear.

Gas Meter.—From many standpoints, the use of a small weighable cylinder of oxygen is to be recommended. On the other hand, there are certain advantages in favor of using an accurately calibrated gas meter under such conditions as to preclude excessive temperature fluctuations. Benedict and his associates have almost always employed a large cylinder of oxygen with a needle valve, conducting the gas through a carefully calibrated meter of the type devised by Bohr and manufactured by the Dansk Maalerfabrik of Copenhagen. This meter registers 5 liters for each complete revolution of the drum and may be read directly to 50 c.c. Being constructed of britannia metal, it may, without injury, be completely immersed in water in a large aquarium vessel and so leveled as to be easily read. The corrections for temperature changes are minimized by this immersion in water. It is not possible, of course, to control the barometric fluctuations and the meter readings should, therefore, be corrected not only for the average of the temperature fluctuations obtaining throughout the experimental period, but also for the average changes in the barometer. For relatively short periods, this can best be done by using the temperature readings taken at the beginning and end of the period, and the barometer readings taken at the same time.

The meter is calibrated by the method of weighing the gas delivered from an oxygen cylinder. Many tests of this type of meter show that, when properly installed, it gives admirable results, and when a long series of experiments is contemplated, its use is strongly recommended. A small, weighable cylinder of oxygen is required in either method, since such a cylinder is necessary for the calibration of the gas meter.

The oxygen leaving the cylinder first passes through the small bottle of water, which is immersed in the tank containing the gas meter. This serves to saturate the oxygen with water, for in its compressed state it is extremely dry.

Spirometer or Tension-Equalizer.—Although an absolute temperature control is theoretically possible with this apparatus, thus securing a constancy in the apparent volume of the air in the closed system, it is practically impossible to prevent slight temperature fluctuations, and these, together with the unavoidable and uncontrollable fluctuations in the barometric pressure, indicate the necessity for some form of tension equalizer which will insure atmospheric pressure in the chamber. For this chamber a small spirometer is used. When a mouthpiece or nosepieces are employed with the universal respiration apparatus instead of the chamber, the entire air current passes through the spirometer, and sundry devices are attached to it for tracing graphically the volume of each respiration and for indicating the total ventilation of the lungs. When the respiration chamber is used, however, it is not necessary for the air current to pass through the spirometer; consequently, the three-way valve is closed to the spirometer and direct connection is made between the spirometer and the respiration chamber by means of a pipe.

As commonly used on the universal respiration apparatus, the spirometer has a content of about $2\frac{1}{2}$ liters. With a small spirometer there is always a possibility that a patient may suddenly make a violent or extended muscular movement inside the chamber, such as in turning over, throwing off the bed clothes or unduly moving the arms or legs, which would produce an expansion of air that would lift the bell of the spirometer above its normal limits and

out of the water, thus causing a leakage of air. Two practical methods may be employed for preventing this, even with a small spirometer. One is to place a weight of 80 grams on the bell of the spirometer when it is rapidly rising, thus immediately lowering it; the weights can be removed when the conditions inside the chamber have again become normal. Another expedient is to place a bar across the top of the spirometer guide supports in such a manner as to prevent the bell from rising high enough for air to escape. With the use of such devices when necessary, a spirometer with the ordinary volume of $2\frac{1}{2}$ liters is sufficient for use with the clinical chamber. Furthermore, experimental periods in which the muscular activity was sufficient to expand the air unduly would be of little, if any, value. With the use of the small spirometer, however, the operator should take care that no air is lost through undue elevation of the spirometer bell or the admission of an unnecessarily large amount of oxygen.

The exact height of the bell should be recorded at the beginning and end of each experimental period by noting the position of a pointer attached to the counterpoise and travelling over a vertical millimeter scale. The spirometer bell is delicately counterpoised so as to give zero pressure at approximately a middle point of the scale.

Manometer.—The small oxygen consumption and the large volume of the respiration chamber with its accessory parts make the influence of slight changes in temperature and pressure of great moment in measuring the total oxygen consumption. Consequently it is essential to note the exact pressure inside the chamber. This is assumed to be atmospheric, but it is possible that the spirometer does not respond instantly to slight changes in pressure; accordingly it is more efficacious to use a very delicate manometer. This manometer is of the type employed by Pettersson and Sonden in their gas analysis apparatus and indicates the slightest alteration in atmospheric pressure. It consists of a glass tube bent in the form of an arc and containing a drop of petroleum oil.

Balances.—The carbon dioxide elimination is determined with this apparatus not by means of gas analyses, as is customary, but by accurately weighing the soda-lime bottle and its accompanying Williams bottle. These two absorbers have a combined weight of not far from 5 kilograms, and since approximately 10 to 15 grams of carbon dioxide may be produced in a half-hour period, it is necessary to weigh these two vessels to within 0.05 gram.

Barometer.—One of the most important factors in the accurate measurement of the oxygen consumption is a knowledge of the temperature and of the barometric conditions obtaining inside the large respiration chamber at the end of the experimental period. The measurement of the barometric pressure gave entirely unlooked for difficulties. From a consideration of the volume of the chamber—i. e., about 550 liters—it will be seen that a change of 0.1 millimeter in pressure corresponds to a variation in volume which, as will appear later, affects the measurements of the oxygen consumption by about 72 c.c. Accordingly our authors recommend the use of the highest grade standard barometers, with special illumination and lens attachment to read to 0.05 mm.

Connections of the Apparatus with the Respiration Chamber.—The universal respiration was primarily designed for studying the respiratory exchange by using nosepieces or a mouthpiece. When the three-way valve is turned and the coupling is connected with the pipe at a point in the line, the universal respiration apparatus is ready for accurate tests with nose or mouth-breathing. All that remains is to turn the three-way valve at the proper moment so as to connect the mouth of the subject with the air pipe. With the clinical respiration chamber, however, the apparatus is used in an entirely different

manner. The main ventilating current of air, instead of passing continuously through the spirometer, is so deflected by a valve as to pass directly from the chamber to the rotary blower without passing through the spirometer. Furthermore, the returning air, instead of passing along to the spirometer, goes directly to the chamber. With this form of connection, therefore, the pipe serves simply as a lead from the chamber directly to the spirometer, which is no longer a part of the ventilation circuit, but has become a true expansion chamber connected with the large respiration chamber.

Respiration Chamber.—The respiration chamber is, in a certain sense, but an elaboration of the smaller chambers used for small animals, or, more especially, a modified form of the chamber of the bed calorimeter. From the clinical standpoint the chamber is the most important feature of the apparatus.

The chamber is constructed of sheet copper, 0.5 millimeter thick, in two parts, a base consisting of the bottom of the chamber together with a deep water seal and the cover of the apparatus. The inside of the chamber is 200 centimeters long and 65 centimeters wide. The cover is curved and so constructed that it rests in the water seal; the closure between the cover and the base is therefore air-tight. The highest point of the cover is 52 centimeters from the bottom and the radius of curvature of the top is 34 centimeters. The pipe which leads directly to the spirometer or tension equalizer and provides for the sudden expansion or contraction of the air inside the chamber, enters through the cover near the ventilating fan i.

The base is substantially mounted on wooden supports. Through the bottom are conducted the pipes for the ventilating air current, including the intake pipe and the outgo pipe.

Three small tubes also project through the bottom. These may be used for connection with the stethoscope, the pneumograph, or for any other purpose.

There are in addition several openings in the cover of the apparatus. A window of plate glass is placed in a recess of the cover and made thoroughly air-tight with physicists' wax. This may be easily tested at any time by pouring a centimeter of water over it. Provision is made for the insertion of the thermometer and psychrometer and for the insulated connections for the electric fan used inside the chamber. In the top of the cover is a small water sealed opening e, which may be used to pass in or take out small objects, such as a clinical thermometer, a glass of water, urine bottles, or similar articles. By simply removing the cover of the hand-hole the entire cover of the apparatus may be lifted off in a few seconds without disturbing either the thermometers or the electrical connections. Experience has shown that it is possible to converse freely with the occupant of the chamber without a telephone, and the large window immediately above the subject gives an appearance of light and freedom, with absence of psychical disturbance, which is very much to be desired.

With this hermetically sealed chamber it is obviously necessary to provide for a ventilating air current and oxygen supply, unless the principle of Kaufmann²³ is employed and the carbon dioxide is allowed to accumulate. This respiration chamber lends itself admirably to tests by the latter method, if they are desired, as the spirometer which is directly connected with the chamber allows for an expansion of the air without loss of carbon dioxide or a diminution of air. Such an experiment is, of course, limited by the increment of the carbon dioxide percentage. In actual practice, however, we invariably ventilate the chamber by means of the universal respiration apparatus already described. Final adjustment of the pressure inside the chamber is obtained by means of the petroleum manometer. While the manometer is shown here as attached near the spirometer it may be located at any point

near the large chamber without affecting the principle underlying the method of measurement.

Circulation of Air Inside the Chamber.—To provide a gentle movement of the air which shall aid in the temperature control, thoroughly mix the air in the chamber, and maintain comfortable conditions for the subject, a rotary air impeller, of a standard type is installed inside the cover of the chamber. The discharge from the blower is directed towards the curvature of the top in such a way as to blow directly on the wet bulb thermometer and provide for the maximum air movement and equalization of both temperature and composition of air. It is necessary to operate this blower a half hour before the experiment begins so that it may be thoroughly heated to its ordinary running temperature.

Temperature Measurements and Control.—An accurate and rapid temperature control for this chamber is of fundamental importance, even more important, in a sense, than the comfort of the subject, for to obtain an exact measurement of the oxygen consumption, the difference between the average temperature of the air inside the chamber at the beginning and that at the end of an experimental period must be accurately known. Theoretically an electrical resistance thermometer is to be preferred for obtaining these temperatures. As it was undesirable to complicate the apparatus further by the addition of an electric equipment of this type, four good mercury thermometers, graduated in 0.1° C., have been used and found to serve the purpose admirably. These are placed at different points in the chamber. The average readings of these four thermometers give a most satisfactory measurement of the average temperature of the air in the whole chamber, particularly when the subject has been in muscular repose for at least ten minutes prior to the final reading.

To control the temperature normally the temperature environment of the room is held at such a point as to allow for a rate of normal heat radiation which will keep the temperature of the air inside the chamber not far from 22° to 23° C. In winter this is readily accomplished by a simple adjustment of the windows in the room. In summer it is more difficult, but for the greater part of the year it has been found practical to bring away the heat when necessary by placing a piece of moist cheese cloth over a portion of the top and directing the current of an ordinary electric fan over the surface. In all but the hottest days of the summer this method has proved most satisfactory. In any event, the rapid movement of a current of air over the outside surface of the chamber, either with or without the use of the damp cheese cloth, assists greatly in the temperature regulation. As will be seen later, however, the distribution and sensitivity of the thermometers is such as to compensate for considerable temperature change without affecting the measurements.

Method of Recording the Pulse Rate.—An accurate record of the pulse rate is of fundamental importance in all metabolism experiments. The usual method employed for such measurements is for an observer to listen to the heart beat through a Bowles stethoscope attached to the chest of the subject.

Control Tests.—Having tested separately the universal respiration apparatus and the respiration chamber, and having found them tight, it is necessary to demonstrate further the efficiency of the apparatus for measuring the respiratory exchange and particularly the respiratory quotient by making a series of control tests. The control tests used for the clinical respiration apparatus were, in the main, of two types, either chemical tests in which definite quantities of alcohol or ether were burned inside the chamber, or physiological tests with animals either fasting or after surfeit feeding.

Alcohol Check Tests.—The use of ethyl alcohol of known composition for testing the accuracy of respiration chambers is of long standing. The alcohol test may be used in two ways. When the respiratory quotient is alone of

interest, alcohol may be burned in the chamber and from the ratio between the carbon dioxide produced and the oxygen consumed, the accuracy of the apparatus for studying the respiratory quotient is determined. Thus the theoretical respiratory quotient of alcohol is 0.667. In other words, for every liter of oxygen absorbed in the combustion of alcohol there should be produced 667 c.c. of carbon dioxide. In this type of test it is unnecessary to note the weight of alcohol burned, as only the ratio between the oxygen and the carbon dioxide is desired. This test is made very rapidly, and if there is a leak in the chamber or an error in the oxygen introduction or in the absorption of carbon dioxide, the respiratory quotient of the alcohol will be distinctly affected. During the winter of 1914-15, a very large number of alcohol check tests of this type were made in which respiratory quotients materially different from the theoretical quotient were but rarely found.

The second type of alcohol test includes the measurement of the amount of alcohol introduced. From the weight of alcohol used, together with its specific gravity and percentage composition, the theoretical value for the carbon dioxide produced, and the oxygen consumed may then be computed, and these values in turn compared with those actually found by measurement with the respiration chamber.

Determination of the Carbon Dioxide Production.

The determination of the carbon dioxide production by this apparatus is theoretically extremely simple, since it is based solely upon weighing the carbon dioxide absorbing vessels before and after the experimental period. That the entire carbon dioxide production of a man is thus found rests upon two assumptions first, that the change in weight of the bottles is due solely to the carbon dioxide given off, and second, that the quantities of carbon dioxide remaining in the air inside the chamber are the same at the beginning and at the end of each period.

In considering the first assumption the technic must be such as to make sure that the air is dried to the same degree before it enters the carbon dioxide absorbers as it is when it leaves the following Williams bottle or water absorber. Extensive experience in this laboratory in the past has shown that errors of this nature are absent with proper attention to the amount of water allowed to accumulate in the Williams bottle.

With regard to the second assumption—namely, the constancy in the amount of carbon dioxide remaining in the air in the chamber—it will be seen that this depends in large measure upon the relationship between the carbon dioxide production and the rate of ventilation of the chamber. With a normal ventilation of 35 to 45 liters per minute and with a regular carbon dioxide production, repeated tests, based upon accurate analyses made in connection with control tests of this apparatus as well as of the bed calorimeter, show that the variations in the residual carbon dioxide in the chamber are practically negligible. If, on the other hand, the subject is more or less restless and there are material differences in the amount of carbon dioxide produced from hour to hour, residual analyses are essential. Complicating the experimental procedure by residual analyses is, however, to be avoided, if possible.

With the subject in complete muscular repose, there is but little variation in the metabolism from hour to hour, and the assumption that the residual carbon dioxide remains constant holds true. Accordingly, if there are changes in the residual carbon dioxide, these are occasioned by such muscular activity as would exclude completely the use of the results for any practical purpose.

It is perhaps especially fortunate, however, that so far as the determination of the respiratory quotient is concerned, material variations in residual carbon

dioxide are essentially without effect. If, for example, there is an increment of one-half liter of carbon dioxide inside the chamber during the experimental period, obviously the absorption of carbon dioxide in the soda-lime bottles will be one-half liter too small. On the other hand, the space occupied by the additional carbon dioxide in the chamber would normally have been filled by the admission of one-half liter of oxygen and hence there is a similar deficit of one-half liter in the oxygen measured, the two errors essentially compensating. For all practical purposes, therefore, the measurements of the residual carbon dioxide may be entirely neglected without sacrificing in any way the accuracy in determining the respiratory quotient, even if complete muscular repose is not secured.

Determination of the Oxygen Consumption.

While the determination of the carbon dioxide production is very simple in theory and reasonably simple in practice, the determination of the oxygen consumption requires a much more complex procedure. Theoretically, nothing is simpler than measuring the oxygen admitted to the chamber as the subject lies breathing normally, but practically the record of the amount of oxygen admitted is the position at which the spirometer bell remains. Thus at the end of an experimental period it is attempted to have the same apparent volume inside the chamber as at the beginning of the period, but even though the apparent volume remains constant, there are several factors which influence this volume. Those of temperature and pressure are obvious, but correction can readily be made for them from the temperature readings and accurate barometer readings provided for. It has already been pointed out in the preceding section that any changes in the carbon dioxide residual in the chamber reduces the oxygen admitted, but it is important again to note that even this substitution of carbon dioxide for oxygen is without material effect upon the respiratory quotient. We have also to consider the possible variations in the measurement of the tension of aqueous vapor inside the chamber.

Measurement of the Tension of Aqueous Vapor.—The volume occupied by the water vapor inside the chamber may fluctuate with the changes in temperature and, indeed, with any changes in the amount of water vaporized from the lungs and skin of the subject, even during repose. These variations are best expressed not in cubic centimeters of water vapor inside the chamber, but, for the purposes of computation, are more advantageously designated as tension of aqueous vapor in millimeters of mercury, the amount of this tension being deducted from the observed readings of the barometer. Instead of determining the tension of aqueous vapor by the gravimetric method—i. e., by absorbing water vapor in U-tubes containing sulphuric acid—we have relied upon an accurate psychrometer comprised of wet and dry bulb thermometers, graduated in 0.1° C. and capable of being read with a lens to 0.01° C. By means of the small blower suspended on the inner side of the cover of the chamber, the air is blown with considerable velocity directly over the bulbs of the thermometers. The depression of the temperature of the wet bulb over that of the dry bulb is carefully noted and then, from standard psychrometric tables, the tension of aqueous vapor is computed.

The validity of this method of measuring the water vapor was tested in several ways, first by introducing a second wet and dry bulb psychrometer in the main ventilating air-current as it left the chamber, and finally by the removal of definite volumes of air and passing them over U-tubes containing sulphuric acid and pumice stone. While it was obviously impossible to secure absolutely the same degree of humidity at each point of measurement, nevertheless when fluctuations occurred, the curves were all parallel and convinced

us that the psychrometer as installed gave accurate results. Before each experiment the wet bulb thermometer is removed and thoroughly drenched with distilled water with which its reservoir is filled. Under these conditions most satisfactory results are obtained.

Temperature Measurements.—While theoretically an electrical resistance thermometer with a series of coils distributed in various parts of the cover would be ideal, tests made with a large number of accurate thermometers placed at different points in the chamber showed that average temperature conditions could be obtained by reading the temperature recorded by the thermometers. Even with the subject lying inside the chamber, when the small blower on the interior wall is running at a moderate speed, the temperature conditions throughout the chamber, as indicated by the thermometers suspended at different points, seem to be very constant.

Measurement of Barometric Pressure.—Each millimeter change in the barometer corresponds to approximately 700 c.c. of air. Accordingly barometric measurements should be made with the very greatest care, preferably to 0.05 millimeter, this corresponding to an error approximately ± 35 c.c. for each individual period. Obviously the temperature of the barometer with the correction therefor is recorded each time, and from the barometer readings are deducted the value for the tension of aqueous vapor obtained from the readings of the psychrometer as computed from the psychrometric tables.

Routine of an Experiment.

The subject should be lying upon the bed of the respiration chamber not less than ten minutes, before the cover is put in place. This is especially necessary if the subject has been unusually active or has walked about considerably prior to the experiment. The stethoscope should be attached and records of the pulse-rate begun immediately, as the best index of the quiet condition of the subject is the pulse-rate, which should have practically reached a level before the experiment is begun. The ideal condition for a subject is complete relaxation and muscular repose, with a minimum, regular pulse-rate. The subject may lie either on the back or on the side as, in this type of apparatus, a fixed position of the head is not necessary. Inasmuch as there is always a slight warming of the ventilating blower inside the chamber, due to the passage of the electric current through it, the blower should be started as soon as preparations are begun for the experiment, as the longer the blower runs before the experiment begins, the better will be the results obtained. The subject should be fully dressed, including stockings and shoes; in addition, a pair of woollen socks should be drawn over the shoes, for it has been the experience of most subjects that if any discomfort is felt it is from a sensation of coolness about the feet, ankles, and the lower part of the legs. This is due to the fact that the air inside the chamber is always moderately dry—i. e., with relative humidity of about 60 percent—and is kept in rapid circulation by the fan blower. The sensitivity of the movable bed may be determined either by pressure with the hand or, more accurately, by dropping a known weight from a certain height upon the bed and noting the amplitude of the marking upon the kymograph record. After the soda-lime bottles and the Williams bottles have been examined to make sure that they have not become exhausted or will not become exhausted before the experiment is over, the cover is lowered with the hand-hole open. It has been found practical to suspend the cover with two cords running through pulleys and to counterpoise it in part to assist in lowering it into place. When the cover is in position the counterpoise weight is removed so that the cover rests solidly in the water

seal on the base of the chamber; the cover of the hand-hole is then put into place.

As it requires some time for the atmospheric conditions inside the chamber to become constant, it has been found advantageous to delay starting the ventilation throughout the air circuit for approximately fifteen minutes. During this time the carbon dioxide accumulates inside the chamber until it amounts to approximately 0.3 or 0.4 percent of the volume of air. The moisture likewise accumulates to some extent. At the end of fifteen minutes the rotary blower is set in motion and the air-current begins to circulate. The several thermometers and the psychrometer are then read. The temperature of the room should be adjusted by opening the doors or windows so as to establish temperature equilibrium as soon as possible, for with a quiet, resting person the difference between the temperature of the room and that in the chamber is approximately 3° C. As soon as temperature equilibrium has been obtained—and this is usually inside of fifteen or twenty minutes after the ventilation has been started—temperature readings are taken, a simultaneous reading of the barometer is made, and the position of the spirometer bell is accurately recorded. The valves are then turned.

While the spirometer is so counterpoised as to give 0 in one position, it is not an exact counterpoise, and slight differences occur. It is desirable, therefore, for the operator, while reading the position of the spirometer bell, to hold the counterpoise of the spirometer lightly in the hand in such a manner that the petroleum in the manometer registers exactly 0 at the time that the spirometer is read. If this adjustment is made at the end of each period the slight differences in the position of the spirometer bell are compensated. From the average temperature readings, the barometer readings, and the record of the position of the spirometer bell, the apparent and real volume of the chamber can be computed, the weight of the subject being taken into consideration and due allowance made for the displacement of air by the body of the subject.

During the entire time that the motor is running carbon dioxide is being removed from the chamber in both the preliminary period and the main experimental period. This removal of the carbon dioxide causes a diminution in the volume of air in the chamber. In the preliminary period this may be compensated by an increase in the temperature and the spirometer bell will thus remain in essentially the same position as at the beginning, or, as is usual, oxygen is introduced to maintain the spirometer bell in a median position. It should be noted, however, that no measurement is necessary of the oxygen introduced during the preliminary period, as only the amount added during the actual experimental period to maintain the spirometer bell at or about its original position is of importance. The amount of air residual in the chamber at the end of each period, as determined by the measurements of the temperature, the barometer, the psychrometer and the actual height of the spirometer bell is taken into consideration in the final computations.

The length of the experimental periods may vary considerably. Theoretically, the longer the experimental period is, the more reliable will be the results, for all errors in the readings of the thermometers and the barometer are minimized when extended over a long period. Practically, however, it is very desirable, especially with subjects in the post-absorptive condition, *i. e.*, without food, to shorten the experimental periods as much as possible. Our observers have proved repeatedly that with quiet subjects, especially when they are asleep, determinations with a high degree of accuracy can be made in one-half hour periods. In a large number of cases, after a preliminary period of thirty-five to forty minutes, we have been able to secure three successive one-half hour periods with the greatest uniformity in results. If the subjects are restless, and particularly if the restlessness occurs toward

the end of the experimental period, the temperature and moisture are materially affected, and the experimental periods must, in consequence, be extended. While it is always a question as to whether it is advisable to attempt any observations with patients as restless and conditions as disturbed as in such cases, yet it has been our almost universal experience that patients, as well as normal individuals, almost always become drowsy during an experiment and are inclined to fall asleep. The air inside the chamber is constantly in motion, the atmosphere is cool and pleasant, there is no odor, and the psychical conditions are, in general, most beneficial and satisfactory.

Benedict²⁴ has recently described a new form of a portable respiration apparatus for clinical use. Pearce²⁵ has also described a clinical method for determining the respiratory exchange for clinical purposes. His method is based on those of the Tissot and the Douglas methods.

(To be continued.)

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ORIGINAL ARTICLES.

HOSPITAL STANDARDIZATION.*

By JOHN G. BOWMAN, M.D., Director American College of Surgeons, Chicago.

About five years ago a group of surgeons met in Washington. They met with purpose and determination. Incidentally, they were well acquainted with one another; held together by bonds of common vocation and by friendship. Straightway, then, they asked themselves these questions: First, are the highest standards known in surgery too good for the humblest man, woman or child on this continent? Second, are we true to our life's work unless we do our utmost to provide the best that is known in our profession for every man, woman, and child, irrespective of station or place of residence?

With swift decision the surgeons answered these questions. Then they formed themselves into an organization, known as the American College of Surgeons, and gave out of their pockets over \$526,000 in order to make their aims come true. Later they voted for themselves annual dues of \$25.00 for the same purpose. In all the history of medicine or of any other profession do you know of a more altruistic and determined effort in the direction of high-minded leadership than that?

But how does this action now concern you? The answer is obvious. If any group of medical men would advance the practice of medicine, they must look to the hospitals. They must have the good-will and co-operation of hospitals. And another fact in this connection is also obvious. If you are to fulfill your highest mission, you must look to the doctors. You must have their good-will and co-operation. All doctors and all hospital folk are bound together by a common purpose which is to take right care of sick people. Success is in team-work.

But assuming that we are all willing and glad to work together, what is to be done? Many things, of course; but among the many things to do, what things should be done first? Naturally there are differences of opinion in answer to this question. My purpose now is to state the answer to which the College, after many conferences, arrived. And in stating this answer, permit me first to state the underlying ideas which have been our guide.

The first of these ideas is that we all believe in these days that we have a right to health. The second idea is that, in a broad sense,

*Address before the Catholic Hospital Association at the Third Annual Meeting, Chicago, June 18, 1918.

all hospitals are public service corporations. These two principles must be reckoned with at all times in whatever program we attempt to carry out. Let me emphasize the importance of these points.

Suppose that a man is brought into your hospital from a street accident in an unconscious condition. Suppose a little later that the man becomes conscious. Is it thinkable that you would then say to him: "Can you pay us if we take care of you? If so, we will treat you and probably save your life. If you cannot pay, please arrange to leave at once."

No, that is not our attitude toward any patient. It cannot be. If the patient is able to pay, he should pay as a duty of good citizenship. If the patient is not able to pay, he is, notwithstanding that fact, well cared for. Clearly defined public opinion really compels this procedure among hospitals. As a people we look upon hospital service no longer as a luxury which we may buy, but rather as an inherent right. The humblest patient is by common consent entitled to the best of service. We regard the right to health very much as we regard the right to own property or the right to live.

From this conception of our right to health, it follows that all hospitals in a broad sense are public service institutions. On the other hand, hospitals in which sound, honest care is given patients may reasonably ask the confidence, goodwill, and support of their communities; on the other, all hospitals are accountable to the public for their degree of success. By general consent the time has come for an accounting on both sides of the equation. Such an accounting is inevitable. If the initiative is not taken by the hospitals and by the medical profession, it will be taken by the lay public. This entire accounting is what we mean by hospital standardization. It is an analysis of the obligation of the public to support hospitals; and it is a practical accounting to the public of the business and scientific efficiency of hospitals.

Let us, further, consider your side of the equation. Suppose that I come to you as a citizen of your community and ask you whether or not you take honest and competent care of all of your patients? You reply promptly, "Yes." But I insist that you give me real evidence that you do as you claim. Tell me, could you today produce that evidence? Could you show on specific data that every case under your care has been properly studied and treated? Let me answer this question for you. The facts are that only a meager percentage of the hospitals on this continent could produce the evidence.

What are the data which you may reasonably be asked to show in a situation such as I have described. They are, of course, that the hospital building is clean and sanitary; that the doctors privileged to practice in your hospital are of worthy character and of sound scientific training; that you have adequate equipment, etc. But are

such data enough? Is it not reasonable to ask that the hospital have in writing and on file, in an orderly fashion, a statement of exactly what happened in the care and treatment of each patient? What I mean, of course, is an adequate case record system.

Approached in this way, case records are of vital significance; they are the justification of the hospital before its community. Case records, also, as you know, serve a most practical purpose in the care of patients; they are of value to medical science, and not infrequently they possess medicolegal value. But above all, let us keep in mind that the records serve as an efficiency test in the care of patients.

Adequate case records need not be voluminous. There is no necessity for "novel writing." But the records will usually include data under such headings as these: What did the patient think was the matter with him? What was the diagnosis of the doctor? On what data did the doctor base his diagnosis: physical examination, laboratory findings, the x-ray findings, etc.? What was the treatment, medical or surgical, or both? What complications followed the treatment? What was the final diagnosis and the condition of the patient on dismissal?

The keeping of an adequate case record system is a matter on which there is no dissension either among hospitals or in the medical profession. It is the first requirement which the College accepted in its present hospital survey.

The second requirement of the College is both more difficult to explain and more difficult for the hospitals to put into effect. It is that after the hospitals have an adequate case record system in operation, the staffs of the hospital analyze those records and find out for themselves the merits and the shortcomings of their own work. The College asks that each hospital staff meet at regular intervals, and that with the highest seriousness in their hearts they analyze what they are doing for their patients.

Doctors are busy men and unless the case records are summarized, each case upon a card, let us say, about 5 by 8 inches, the analyses of the records becomes an impractical matter. But the matter of the summary card is one of detail which a moderate amount of intelligence will easily provide.

Now, let us see what may happen at one of these staff meetings. Let us understand the word *staff* to mean all of the doctors who are privileged to practice in the hospital; and let us suppose that the obstetrical service of the hospital comes up at this time for special review. Let us suppose, as we found in one large hospital, that the percentage of women delivered by Caesarean operation was twenty times higher than normal, and that practically all of these operations were performed by two of the younger men on the staff. Now are you who have to do with the administration of the hospital

responsible under such circumstances? Is the staff, every member of it, responsible? Can you or any member of the staff sit by and say that you were not aware that such work was being done in the hospital, or that you are not responsible?

My purpose is not to "attack." It is to bring home to you that you and every member of your staff should "raise hell" rather than submit to any association with such work. The thing to do, first, is by means of the summary cards, to obtain the exact information and, second, in the presence of the staff to ask the men who performed the operations to explain their marvelous records. In all of our hospital work what we lack is not ability or knowledge, but fearless passion to create new and higher standards. If any staff is unwilling in a kindly but accurate fashion to review its own work, it is unworthy of any public confidence or support.

Again, let us assume that 40 percent of infection reasonably chargeable to the hospital were existing in the obstetrical service at the time of this staff meeting. Is there anything unreasonable if the staff asks the doctors who have charge of these infected cases to explain the cause or causes of the infections? It is not the business of the entire staff to take steps promptly which will make similar recurrence less likely to occur?

But the staff meetings should not deal entirely with the nature of the medical and surgical work done in the hospital. The staff will necessarily have to deal with such questions as the privilege of practice in the hospital. We have found in many a prosperous hospital that a small group of competent men were designated as the staff; that these men were carrying on a very high type of medical and surgical treatments of patients; that their physical examinations, laboratory records, etc., were above criticism. But we have found, also, in these same hospitals that, without the consent of the staff, the hospital administration has thrown the building open to practically any physician or surgeon who may wish to bring patients to the hospital. These "visiting doctors" are not under the slightest obligation to keep case records or to account in any fashion whatsoever to the hospital for the sort of treatment which they render their patients. In other words, in this type of institution a dual standard exists—a high standard for the "regular staff" and no standard at all for the "visiting staff." Such a situation is disheartening to a doctor who wants to do the right thing by his patients. It is a situation quite intolerable.

To summarize the second requirement which the College has set down in its first survey of hospitals: It is that the staff in co-operation with the administration of the hospital and its board of trustees hold regular meetings to consider the character of the care rendered to patients.

The third step in our program takes us to the laboratory service.

If your staff is of the right stuff and with conscientious determination goes about its business, the laboratory practically will take care of itself. A hospital today without laboratory service or without immediate access to laboratory service is unthinkable.

It is not my purpose now to go even briefly into the physical equipment of the laboratory. This is a matter which, with the guidance of your staff, is easily solved. The essential thing in a great majority of hospitals is to awaken in them a real desire to have a laboratory. When this is accomplished, the laboratory problem is practically solved. You have already pledged yourselves to provide adequate laboratory services in your hospitals. No one could meet with you here today and for a moment doubt your ability or your determination to carry out that pledge where it is not already effective in your institutions.

There is one other requirement which, with regret, the College found necessary to include in its plan of hospital standardization. That requirement has to do with fee-splitting. This practice is the buying and selling of sick people on the part of the doctors. It exists in its most virulent form in many localities in the middle west. It makes for unnecessary surgery, for incompetent medical and surgical service, and it injects into the medical profession an element of dishonesty with which no fine ideals can exist. Tell me, does that sort of thing exist in your hospital? Did you ever make a genuine effort to find out whether or not it does exist? Have you got inside of yourselves the fearlessness which you may find necessary to use in dealing with the practice?

In conclusion permit me to observe that, as no other body in the world, you have consecrated your lives to the work you are doing. In asking you to coöperate with us in the plan which I have just outlined, we ask it only on the ground that it appeals to you as right. If at any point the plan does not meet with your approval, we should appreciate your suggestions and criticisms. The resolutions which you have just passed makes this meeting one of the most historic occasions for the medical profession which has ever been held on this continent. It means that, not only Catholic hospitals, but all hospitals will take up the standards of service to which you have pledged yourselves. It means real standardization of hospitals and it means standardization of doctors. It means that we agree upon a common meeting ground and that, as soon as we can put into effect the program as outlined, we shall stand together on a basis from which further headway will be practicable.

There are many important questions for us all to consider when that time comes. The training of the nurses is one of these questions. Again, what are you doing for the interne? Are you making a reasonable effort toward post mortem examinations? Are the post mortem examinations which are performed in your hospitals of genuine merit and are the results of these examinations brought before your staffs?

THE NEED FOR STANDARDIZATION OF HOSPITALS FOR THE INSANE.

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There is probably no special class of hospitals in greater need of standardization than that devoted to the care and treatment of the insane. Vast sums are annually appropriated for the maintenance of the public institutions for the insane. From the standpoint of the taxpayer, every effort must be made to establish methods of economical care. It is of vital importance to the public welfare, however, that such equipment and facilities be furnished as will promote every possible chance for restoration, and that provision be made for prophylactic measures; for it should be generally recognized that the likelihood of recovery may be increased, and recovery itself hastened, by the application of proper methods of treatment, and that in prophylaxis lies the principal hope for the future in combating the ever-increasing problem of the insane.

In general, there are three great classes of institutions for mental diseases—the private, the county, and the state. The private hospitals, usually called sanatoriums, occupy a peculiar and special position, often providing the exclusive and individual care which appeals to those who can afford the high rates commonly demanded. There are many well-equipped and admirably conducted private hospitals where the most modern forms of treatment and the best results may be obtained. On the other hand, unfortunately, there are privately conducted institutions, hospitals in name only, with exorbitant rates and bare custodial care, the standard being scarcely above that of a first-class almshouse.

The county hospitals, aside from the few large institutions which resemble in management the state hospitals, are generally unsatisfactory. This is, for the most part, due to a close affiliation with almshouses and to political administration. The limitations of this paper will not admit an adequate discussion of these institutions, with their meager equipment, lack of treatment, and untrained medical staffs, all of which should be regarded as relics of the past.

The state hospitals, usually free from serious political entanglements, with the resources of the state behind them, are provided with larger staffs of trained physicians, better equipment, and more scientific methods. It is the purpose of this paper to consider the state hospitals and to outline briefly what may be regarded as de-

sirable and possibly ideal, according to the present knowledge in respect to equipment, methods, and the like.

In discussing the question of standardization of state hospitals for the insane, one should bear in mind the objects of such hospitals. While in some sections of the country it is still customary to use the term "asylum," and many of the institutions are little better than the old custodial type, the best modern hospitals for the insane have far higher ideals and a broader scope. It should be the aim of the hospital to restore, as soon as possible, the recoverable; to prevent deterioration and to endeavor to reeducate the so-called chronic; to treat successfully the physically ill; to guard against injury or accident, such as suicide; to care for and make comfortable the excited, the feeble, and the aged; to hold those dangerous to themselves or to the public; to make such full examinations and keep such complete records that the work of the hospital will have present and future scientific value; and, finally, through outside agencies, to be an active force for mental hygiene. It is needless to say that all of this is to be done in as efficient and economical a way as possible.

Very little will be said as to the proper size of institutions. This is purely a matter of theory, the actual size of hospitals being largely determined by the exigencies of the situation. Economy and the increasing number of patients make necessary, quite generally, large institutions. While it is undoubtedly true that the average executive will be more successful with hospitals of 2,000 patients or less, institutions of over 5,000 will be found to be efficiently operated, depending on the capability of the administrator and his assistants.

In selecting the site for a hospital, preference should be given to a location somewhat removed from the large centers of population, in order that sufficient ground for exercise, with desirable privacy, may be obtained for the patients, and also ground for a farm and garden large enough to supply the necessary products for maintenance. Some consideration also should be given to the natural beauties and the hygienic qualities of the site, and it is, of course, essential that it be well drained and supplied with an abundance of pure water. While avoiding large cities, it is desirable to have the hospital accessible to a small town or city in order to insure the necessary diversion for employees, the obtaining of whom, at the present time, is an increasingly difficult proposition. The hospital should be connected with both steam and electric railways on account of freight facilities and the convenience of visitors and employees.

In the early days of state hospital construction the architectural tendencies were toward massive single buildings of monastery or prison-like appearance, several stories in height and with rather

numerous but needless ornate features, especially in the administration portions. While attractive appearance should not be disregarded, the substantial and fireproof qualities are far more essential. The present tendency is more toward detached groups of buildings. The so-called cottage plan is probably the ideal, but is not practicable except on a large scale—that is, single buildings accommodating several hundred patients. Farm colonies, utilizing more cheaply constructed and temporary buildings, have demonstrated their usefulness for the chronic, quiet workers. In any case, buildings of more than two stories are seldom, if ever, desirable.

Too much attention cannot be paid to fire protection. The above-mentioned old type of single, large building, often a veritable fire-trap, should be remodeled so as to be divided up into several units separated by fire walls and automatic fire doors. Outside covered fire escapes of approved type and inside fireproof stairways should provide sufficient exits from every floor. These precautions are indispensable, as are also outside hydrants, standpipes, and hose on every floor connected with a water system of sufficient amount and pressure, supplemented by a fire pump for emergency added pressure. All exit doors should open outward.

The interior plans of the buildings, an adequate discussion of which necessitate a volume, will be covered only in a general way. An excellent type of ward is one provided with a day room connected with a fireproof porch, a large dormitory for sleeping purposes, and a water section with sufficient toilet and bathing facilities. Necessary adjuncts are adequate clothes rooms, lockers, and the like. The dormitory for sleeping purposes, simplifying the night watch service, is applicable in the case of most varieties of mental disease, but a few single rooms are often desirable for certain violent, dangerous, or paranoiac individuals.

There should be a sufficient number of wards or units to facilitate proper classification of patients, based largely on their demeanor and physical condition. New patients and those who may be convalescent, feeble, or of the quiet and tranquil type, should not be subjected to the annoyance and undesirable association with the violent, destructive, noisy, and untidy. An idea as to the requirements may be obtained from the following estimated percentage of the different classes. The acute or reception service may be represented by 5 percent; the hospital or physically ill, 2 percent; the chronic, quiet, and clean, 28 percent; the disturbed and violent, 16 percent; the feeble, aged, and infirm, 20 percent; working, 17 percent; tuberculous, 5 percent; epileptic, 5 percent; convalescent, 2 percent. A desirable feature, if possible, is a separate building for the acute, reception, or, as it is sometimes called, psychopathic department, especially well equipped for treatment, including an

operating room. The tuberculous also are preferably cared for in separate and specially designed buildings.

In the matter of toilet arrangements, one seat to ten, or at least fifteen, patients, with twice the number of wash basins, may be considered a minimum requirement. The hoppers should be of the type which flush automatically when used. All hot-water faucets should be provided with safety devices to prevent patients from scalding themselves. Probably the simplest and safest way is to have the hot water turned off and on by means of a key with which only the nurses and attendants are provided, although theoretically the plan sometimes adopted of having a thermostatic attachment to the hot-water system is good.

The question of proper bathing facilities is one only too frequently neglected. No longer should bathtubs be deemed satisfactory equipment. It is a regrettable but actual fact that, where tubs are used as the sole method of bathing, many patients may be bathed by careless or ignorant attendants without changing the water. The only safe and sanitary method is by showers, each patient then being assured a clean bath, and a large number being easily bathed in a short time. Tubs are required for special cases, such as some of the infirm, but shower baths are practicable for the majority of patients, both men and women.

Heating by direct radiation is probably, at the present time, the most satisfactory method. All radiators and hot pipes should be covered or placed out of reach of patients who otherwise might easily be burned. The heating system should be combined with some method of automatic forced ventilation.

Lighting should be by electricity, with properly protected wiring, the only special consideration being that the turning on and off of the lights should be under the control of the nurses and attendants by means of some key device.

It will suffice merely to mention certain other indispensable departments and facilities which for the most part do not require any new characteristics by reason of the special nature of the institution. Every hospital should have a proper method of sewage disposal. Necessary departments are the kitchen, bakery, dairy, store, laundry, the shop—e. g., carpenter, painting, and mechanical, the cold storage and ice plant, the central lighting, heat, and power plant.

Some thought should be given to the proper housing of resident officers and employees. Comfortable quarters should be furnished, the hospital service being for many a lifetime career. There should be an employees' home, with provisions for single and married attendants and nurses.

While the physical conditions of hospitals for the insane present many peculiar problems, such as have been briefly outlined, the

governmental and administrative conditions are even more special in type and importance. Good work may very likely be accomplished by capable men even though handicapped by poor equipment, but surely proper methods of government and administration are indispensable.

Most state hospitals are under the general supervision of an unpaid board of managers or trustees appointed by the governor. That this board should be nonpartisan, free from petty political entanglements, fairly secure in office, and not subject to the liability of sudden removal in the event of change of administration, should be self-evident. This may be accomplished by the provision that the board shall be continuous, the term of office of only a part expiring each year. Among the various duties of the board should be the close inspection of the finances of the hospital—this final control of the expenditures, if conscientiously carried out, assuring the safeguarding of the public's interests.

The selection and appointment of the resident superintendent should be left largely in the hands of the board of trustees, who alone should have the power of removal, giving the executive officer the security in office essential for effective work. The primary aim of the hospital being medical, there can be no question that the chief executive officer should be a physician, one who has gained his experience in psychiatry by actual residence in hospitals for the insane, and who has demonstrated the necessary executive ability. Many of the difficulties preventing successful administration are due to frequent changes and the inexperience of political appointees. Divided and uncertain authority will merely serve to hinder the progress which is otherwise to be expected from the activities of a capable executive.

The assistant officers and heads of departments should be appointed by the board of trustees on the recommendation of the superintendent, and should be entirely under his direction.

Generally speaking, a desirable proportion of physicians to patients is about one to two hundred. The different services require a varying number; the acute or reception, for instance, require more than the chronic. In the larger hospitals there should be an assistant superintendent and a clinical director, the duties of the former being to relieve the superintendent of certain routine matters, such as the help problem; those of the latter being to supervise and correlate the medical work. In the smaller hospitals these two positions may very easily be combined.

There should be enough resident experienced assistant physicians to take charge of the various services. A requisite number of resident junior assistants and interns are required to assure the proper attention to routine details. The interns may be only temporary officers, serving largely for the experience. The other members

of the staff, however, should, as far as possible, be registered physicians interested in the study of psychiatry as a career. Every hospital for the insane should have at least one woman physician on the staff, chief among whose duties should be to make those special examinations and treatments so essential to the comfort and welfare of the women patients.

A successful administration of the hospital will depend largely on the qualifications of the heads of the departments. Executive ability and expertness in the special field, coupled with loyalty and cooperation, are essentials to be looked for. A business manager, purchasing agent, or steward is required, one who is able to install modern business methods, and who is qualified as a judge and buyer of supplies. Other important positions are storekeeper, farmer, engineer, head carpenter, laundryman, and chef, all of which come under the immediate supervision of the business manager. There should be a matron, whose duty is the general supervision of the housekeeping and the help therein engaged. More detailed discussion of these and similar positions is not necessary, as there are no very unusual conditions liable to be met with in these departments, owing to the special nature of the hospital.

The importance of having a sufficient number of reliable nurses and attendants is self-evident. It is in this department, however, that one of the greatest difficulties is encountered, it being almost impossible to secure enough help (in numbers) without much regard to the quality. This has become especially true since the beginning of the war because of the high wages offered by munition and other industries. Many hospitals have been brought to the necessity of hiring practically all applicants without regard to grade, and even then being twenty-five percent or more short-handed. In view of the scarcity of applicants, it is almost useless to state that there should be at least one nurse or attendant to ten patients, a proportion seldom possible at this time. Especially on the reception and infirmary wards for men, women nurses should be employed. Where it is possible to secure enough competent women nurses, they should be placed in charge of other male wards, with resultant improvement in the quality of nursing and housekeeping, and less liability of ill-treatment of patients.

An adequate force of attendants and nurses should be assigned to the night service, the minimum requirements being, generally speaking, one nurse or attendant to forty patients. In any case, there should be a sufficient number of employees to permit the doors of a majority of the patients' rooms to be unlocked at night. This expedient is exceedingly important from the standpoint of fire protection alone, as is also the holding of regular fire drills of both employees and patients, the former being taught the use of fire-fighting apparatus, including hose and extinguishers, which should

be plentifully supplied throughout the hospital, and the quickest way of getting the patients out of the buildings. In connection with this, and for additional fire protection, it is well to have two fire companies composed of outside employees and provided with hose-carts, chemical apparatus, ladders, life-nets, and so forth, and which hold regular, practical drills. The existence of two companies, each with a chief, will result in a wholesome rivalry and increased efficiency. Besides the inside night service, there should be enough outside watchman to insure the required order and safeguarding of the buildings and grounds. As a check on the night service, a modern watchmen's clock system should be installed, or both the inside and outside night employees may be correlated by means of a system of ringing in to a central office, such as is found in a first-class police department. The latter plan combines the desirable features of both a watchmen's clock and a standard fire-alarm system at probably no greater expense.

In immediate charge of the attendants and nurses of each service should be a day and a night supervisor, who are the physicians' representatives in respect to discipline, order, and direction.

The training school for nurses should be an important adjunct to every hospital for the insane. While most of those in immediate charge of the patients will be of the attendant class, perhaps with considerable practical, but with little theoretical, knowledge as to proper methods, the presence of a good training school will mean that there will be a certain number of the more intelligent men and women undergoing instruction which cannot fail to elevate the standards of care and treatment. The quality of the instruction, of at least two, but preferably three, years' duration, should be such that, with an additional post-graduate course in a general hospital, the graduate of the training school may obtain state registration. At the head of the training school should be a competent superintendent of nurses, a graduate nurse of recognized standing. The lectures should be given by the members of the resident medical staff. The ordinary attendants should also receive instruction in the more practical and necessary branches in order that they may have a proper conception of their duties.

While perhaps of less relative importance than in the case of general hospitals, a well-stocked pharmacy is required, presided over by a registered pharmacist. Much of the latter's time will be taken up with prescription compounding, as few drugs will be kept on the wards.

The efficiency of the medical work will depend to a considerable degree on the routine method of examination and treatment prescribed for the medical staff. On admission, every patient should be placed in bed in an observation ward for a week or ten days, during which time a thorough mental and physical examination

should be made. In the physical examination nothing should be neglected. The ordinary laboratory procedures, such as urinalysis, should be supplemented by such special examinations as that of blood, sputum, gastric contents, feces, and so forth, as may be indicated. A Wassermann blood test should be done in each case with spinal fluid examination where indicated. A detailed mental examination, modeled after that recommended some years ago by Adolf Meyer, should be made. The results of the mental and physical examination are then to be typewritten in accordance with a regulation form; the latter being necessary in order that every item of importance in the patient's condition may be covered, for his own welfare and so that the statistical and other records may be made of the greatest possible future value. This, of course, presupposes that adequate clerical and stenographic assistance shall be available.

At staff meetings held daily, or frequently enough for the accomplishment of the work, and presided over by a clinical director or other competent officer, each case history is to be read and the patient presented in person in order that the benefit of a full consultation as to diagnosis, treatment, and other matters of importance may be assured all patients admitted.

Space will not allow a detailed discussion of certain other necessary facilities. To secure thorough treatment for all, there should be proper dietetic arrangements, surgical equipment for any operation, a consulting staff of surgeons, electrical apparatus for diagnosis and treatment, a resident dentist with the required equipment, and some provision for ophthalmological and other special examinations when required.

No hospital for the insane is adequately prepared without provisions for the application of hydrotherapy. By hydrotherapy is meant treatment by means of the continuous bath, the various forms of wet-pack and special baths, such as the needle, rain, shower, the different douches and the like. The lack of hydrotherapeutic facilities (associated also with an insufficient number of attendants, too few wards for the proper separation of the disturbed, and faulty methods of treatment) account to a great degree for the practice in some hospitals of restraint and seclusion, which no longer are countenanced in the best modern hospitals except in extreme cases.

Occupation, when properly applied as a therapeutic agent in the treatment of the insane, not only retards mental deterioration in many cases, but also frequently hastens recovery and serves to prepare the patient for a return to his normal environment. One or more full-time instructors are required, and the various forms of diversional occupation, such as raffia and reed basketry, rug, brush, and broom-making, knitting, crocheting, tatting, embroidery, and the like, cement-work, chair caning, and so forth, should be

made available. Of great value, in the same way, and of considerable economic importance are the opportunities for farm and garden work available to the patients. Besides the foregoing, much of the clothing, the shoes, the mattresses, and some of the furniture may be made by patients under supervision.

There should be a school, with a teacher competent to apply graded reeducational methods helpful in certain classes of patients.

Recreation also is effective as a means of arousing the interest and of combating the tendency to dementia. No community is doing justice to the insane in its care without providing forms of amusement in the shape of dances, moving pictures, baseball, and other kinds of games and entertainments. There should be an athletic field, and also a fireproof assembly hall large enough to accommodate a fair proportion of the patient population. Religious services should be held regularly, presided over by clergymen of the various denominations.

Some reference has already been made to laboratory requirements. Every hospital should be prepared to carry on, as routine measures, the various tests so necessary as aids in diagnosis, not only for mental disease, but also for ordinary physical ailments. The medical staff should be on the alert to secure permission for postmortem examinations in the interest of science and the welfare of humanity. Facilities should be provided for the proper study of the material obtained. The laboratory ought to be in charge of a trained pathologist, with adequate assistants to enable him to do research work.

One frequently hears of the "ever-widening influence of psychiatry," as a consequence of which institutions for the insane and the officers connected with them can no longer restrict their activities to a small sphere of the "asylum," as formerly designated. The facilities for advice, observation, and treatment must be extended by the establishment of out-patient departments and psychiatric wards in general hospitals in the large centers of population. In this way, as is shown by actual experience, thousands of persons may be reached and benefited in the early and borderline stages of psychosis development and restored to mental health in a short time, avoiding what is now so often wrongfully considered the stigma of commitment in a hospital for the insane. The frequently unwieldy, slow, and public methods of commitment procedures, often treating a prospective patient as a criminal, incarcerating him in a jail, escorting him to the hospital, it may be, handcuffed and in the custody of an officer, must be replaced, so far as possible without endangering his constitutional rights, by prompt and expert examination, care of trained attendants, and quick and unobtrusive methods of conducting to the hospital. The system of voluntary admission must be extended, bringing within reach of many pa-

tients, who themselves often realize the necessity for treatment, the early care that insures a brief residence at the hospital. Such facilities are not only of great benefit to the patient, but are really a matter of economy to the state, shortening the length of care in the hospital, consequently lessening the expense, and, it may be, restoring sooner a useful member to the community.

There should be a system of parole of suitable patients by reason of improvements or recovery, affording an opportunity for the trial return to self-support for a period of some months, during which time the patient may return to the hospital for further care and treatment, without a repetition of the legal formalities, should it be deemed necessary. The parole system should be combined with an efficient after-care agency, preferably a member of the medical staff or a social worker, who may have a certain amount of supervision over the paroled patient. Such an after-care worker may render service in advising the return of the patient, if indicated, in assisting in a change of habits or environment, in helping to obtain a suitable position, in arousing a kindly, helpful attitude toward the former patient, in combating the feeling of suspicion or lack of confidence so often met with, and in adjusting difficulties in the home, family, or environment which otherwise might cause a return of the psychosis. The social worker also may be utilized in obtaining additional information from the friends and relatives of patients necessary for arriving at a proper diagnosis. In other words, the state hospital must be the center of advice for mental health, an active rather than a passive agency for good. Without such facilities for the furthering of mental hygiene, a state hospital for the insane cannot be considered fully equipped for adequate service to the public.

It is neither practicable nor essential to elaborate further as to the business methods or other details of administration. These must be left to the executive officer, whose training and experience should be such as to qualify him to solve such problems. And, finally, it must be realized that, while present-day methods are undoubtedly the result of progress, the ultimate stage has not yet been reached. Radical changes in methods will be met with from time to time, it being only necessary to exercise judgment in adopting the same.

TEACHING IN THE HOSPITAL.

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Wherever there is a hospital, irrespective of size and character of work done within its walls, everyone connected with it learns something. It is more than probable that in the first hospital of which we have cognizance, "the House of Mercy" by the side of the Bethesda Pool, people connected therewith learned something, either from observation alone or by being taught. If, therefore, learning something about sickness is inseparably connected with a hospital, the systematic gathering together of the facilities for learning, which in concrete is teaching, is a function indissolubly connected with the hospital. This applies necessarily not alone to the large general and special hospitals, which in large measure or altogether are supported by taxation, but applies equally to institutions maintained through private sources; for in the last instance there is no such thing as a charity hospital, since the inmates thereof do contribute indirectly to the taxations from which they are maintained. Therefore the justification that exists for teaching in large general hospitals should be equally potent for institutions maintained from private sources. The old doctrine of "*quid pro quo*," according to which the poor patient was forced to yield himself for instruction to others in return for the services which were rendered him, from our modern way of thinking is obsolete. As a matter of fact, in some of the largest privately maintained hospitals in the country the case of a millionaire is as freely used for teaching purposes as is the pauper in a charity ward.

Everyone who has long taught in hospitals knows that, with few exceptions, the patients themselves not only do not object to having themselves used for clinical teaching, but, on the contrary, feel that it is to their advantage to have themselves thus used, knowing that their cases are of necessity more carefully studied in order that the teaching may be done to the best advantage. I have known patients who felt themselves neglected because their cases were believed too trivial or uninteresting for demonstration before class. If teaching is therefore to be considered a plain duty of practically every hospital, the question is how it should be organized for the greatest efficiency. By way of digression, I may here state my view that with the hospital containing, let us say, 150 surgical or medical beds, it appears best to have two entirely separate and distinct services. I am fully aware that in many of the most modern in-

stitutions this view is not acted on. My belief for a divided and, of course, continuous service is based on the natural benefits accruing from competition, which of necessity arises where there are two services. An active surgical or medical service of 100 beds each is sufficiently large to keep a staff, including one full time man at its head, busy. Furthermore, the presence of two such services will prevent both teaching and practice from becoming narrow and one-sided, as it might readily and often does become where the single service is in use.

But the first function of a hospital is to cure the sick, and, since there are many excellent physicians and surgeons who are poor teachers, there are, *per contra*, not a few excellent teachers who are neither good physicians nor surgeons. The inability to teach should in no way preclude the appointment to a hospital of a physician or surgeon whose other abilities would make up for his deficiency as a teacher. On the other hand, even unusual qualifications as a teacher should not entitle a man to a staff position unless he is far above the average in the practical applications of his art. It is perhaps for this reason that, wherever feasible, the hospital should be under a university or other educational supervision in order that through it the teaching staff of a hospital may be advantageously organized. The medical life of a community would thus be centered about the hospital—it would become a benefit to all.

At present the physician or surgeon who refers a case to a hospital for treatment or observation practically loses all interest in it. This is practically always so in cases referred to large general hospitals. It should be the duty of the latter to solicit the interest of the physician, thus referring the case, after it enters the hospital, to attend any operation which may be performed, and the autopsy, if such a thing is needed. Through the neglect of this feature a very large, and what might become an important, factor in the teaching of physicians, is absolutely lost. Attention to this courtesy to physicians referring cases would further the good relations between the hospital and the medical man not connected therewith; relations which, unfortunately, are very often not of the kindest.

In the organization of a hospital for teaching purposes every effort should be made to have this teaching clinical in fact, as well as in name—that is to say, it should be bedside teaching. There is very little room now for the amphitheater teaching, of the kind that was almost universally in vogue as late as ten years ago. The large surgical and medical clinics, to which practitioners still flock, must of necessity have small educational values. The amphitheater in a hospital is out of place except for largely attended meetings of medical men, where papers are to be read or a considerable series of cases be actually presented.

To make teaching effective for both student and physician, the

head of every service should have as his assistants men who have by their special application along certain lines developed a knowledge of pathology, clinical microscopy, physical diagnosis, or particular technical skill. To these men should be allotted all the cases in which they would be most interested respectively, thus grouping cases together in larger numbers for teaching purposes. In large hospitals it is not amiss from time to time to rotate men, assistants, and juniors from one service to another in order that their fields of vision shall not become too restricted, and, on the other hand, their general acquirements be made broader.

So far as the function of a hospital in teaching medical students is concerned, it may be safely said that this cannot be much improved on. During the last two years of the undergraduate from two to four hours daily are spent either in the dispensary or in the hospital wards at actual clinical work. Unfortunately the function of the hospital for teaching physicians—in other words, for postgraduate work—is not exercised to the fullest advantage, or, if exercised at all, may do positive harm. In many of the postgraduate hospitals and clinics the physician does not come into actual contact with the patient in the way of a thorough study of his case, thus not “assisting at” the operation except in the French sense of the word, that he is present. For this reason he gets his knowledge from authority rather than from actual personal work. There are few medical men relatively who seek postgraduate work on the cardiovascular, digestive, or nervous systems, while there are very many who seek to improve themselves in surgery and its various specialties by attendance on hospital clinics. It is here that comparatively little good accrues to the attendant, and very much more might come to him if the postgraduate clinic were so organized as to permit the postgraduate to come into actual contact with the patients before operation and to study their cases after operation. The privilege to do this should belong to the medical man who takes a postgraduate course. Unfortunately it is rarely given him.

Next to the function of the hospital in taking care of the patient and to train medical men is that of properly teaching the nurses. There can be no question that this function has been intensively developed until perhaps a condition of hyperfunction has resulted. In view of the great demand for nurses in our military establishments at home and abroad, there is without doubt a dearth of nurses in store for us. The question will certainly arise whether we shall not be forced to lower the admission standard of nurses. I am not so certain that this would be detrimental, because for the ordinary nursing the higher education which is now required is not an essential. There must, of course, be a very high standard for nurses who are to devote themselves to public school nursing, to the

supervision and teaching of nurses in large institutions. For these and allied purposes the very highest requirements would be none too high. But a few hospitals connected with universities in our large medical centers would be perfectly competent to teach this highest class of nurse. On the other hand, it is manifestly absurd for hospitals with ten or fifteen beds to maintain so-called training schools for nurses. The time is nearly at hand, I believe, when we will have to come to two years' training in our well-equipped hospitals as ample for the teaching of the ordinary nurse. This, of course, will not enable her to take care of an operating room or even prepare for an operation, but it will give her sufficient education to take care of the ordinary requirements of the average sick room. Just what part of the curriculum of the present day high grade nurse should be eliminated will become a question for future consideration. These views on the education of nurses are entirely personal, and I know them to be at variance with the views of many of my colleagues, and of the director of nurses of our General Hospital, for whose judgment I have the highest regard. There is now an inadequate supply of nurses for the demands of civil life. An emergency threatens, and for this reason I believe that for the time being it is, or soon will be, necessary to turn out a little less finished product from our schools for nurses. When the crisis has passed, there will be no difficulty in returning to the highest standards.

In regard to the teaching of the public as a function of the hospital, it may be said that every patient who enters a hospital and the friends who come to see him are taught something through that fact alone. Discussion with friends on the part of the physicians in attendance educates them without really seeming to do so. It is remarkable how the faith of the public in hospitals has been strengthened within the last two decades. The public knows which is a good hospital and which is not. It is an adequate judge of the nursing facilities and of the ability of the medical staff.

The public through the hospital has likewise been educated in no small way concerning the various scientific methods used for proper diagnosis, and it has even been made cognizant of the various forms of treatment—operative, prophylactic, and otherwise—that are suitable in any given case. The education of the public has made it lose its dread of the hospital. The public now holds the physician responsible if an appendix operation has been unnecessarily postponed.

In some institutions the teaching function of the hospital in regard to the public has been encouraged through public lectures and demonstrations. This has been tried, but I doubt very much whether it has met with any very material success. The public lectures which were instituted, for example, a number of years ago

in the medical school and hospital, with which I have the honor to be connected, were discontinued after two or three years because of the lack of interest both on the part of the public and the lecturers. Just now, when all of our energies are directed to one ever-pressing and holy cause, it would seem untimely to advocate anything in the way of public lectures in hospitals, lest it might, even by an iota, decrease the energies so essential to quickly reach the goal that is in the heart of everyone.

WHAT IS THE PURPOSE OF THE MODERN DISPENSARY AND OUT-PATIENT SERVICE?

Are Present Methods Adequate to Attain Those Results?

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The main purpose of the dispensary is to give aid to sick people who are not ill enough to need a bed in the hospital. People applying for such aid are presumed to be too poor to pay for a private physician.

What is meant by "too poor to pay a private physician?" Right here we come on the burning question whenever dispensaries are under discussion—that of the abuse of charity, which is said to take place so universally. There should be no question as to this, for, of course, there are people treated in every charity clinic who can afford to pay a physician. We must remember there are people among those of limited education who falsify as to their incomes and resources, just as there are tax dodgers and customs evaders among the more highly educated. We find cheaters in every walk of life—they are to be expected.

Careful investigation,¹ however, shows that the abuse of charities in large dispensaries is less than 2 percent. In small dispensaries, with their more modest reputation, the percentage should be lower. No matter what one's impressions are, nor what flagrant cases one may know about personally, facts are facts. When the question is looked at in its proper perspective, that of the ratio of abuse to the numbers treated, one cannot but feel that far too much emphasis has been placed on this aspect of the dispensary problem.

There are, to be sure, many dispensary patients who could pay a dollar for a visit to a private physician, but what would they get for their dollar? Would they get a gastric analysis, a Wassermann test, a cystoscopic examination, or even a urinalysis? Many clinic patients, when asked about going to a private physician, say, "I've been to one several times, but he has done me no good." "Did he examine you?" "No; he asked me a few questions, looked at my tongue, and wrote a prescription." Patient after patient tells the same story, the story of prescriptions and conversation, but no story

¹A Medical Bugbear—Dispensary Abuse (Michael M. Davis, Jr., Ph.D., 1914, Director of Boston Dispensary). First Annual Report Out-Patient of Barnes Hospital, St. Louis, 1915. Investigation of 200 Cases, Social Service Department Massachusetts General Hospital, 1917.

of a careful history, of a urinalysis, blood tests, gastric analysis, eyeground examinations, etc. Perhaps these patients get a dollar's worth, but what many of them need is ten dollars' worth. In other words, they are in reality too poor to pay a private physician of the skill their case demands. Now, of course, not every patient needs these various examinations, but there is not one who does not need more than a cursory glance at the tongue, a few questions, and a prescription. It is to get what their doctor does not give them, for the price they can pay, that people seek the dispensary. At this point let us hasten to assure you that these statements are not intended as a reflection on the integrity of the doctors. They are made with the recognition that medicine has become complex as to diagnosis and treatment, and that we must wake up to this fact.

To this question, "What is the purpose of the modern dispensary?" we would make the following reply. The dispensary doctor should be to the poor man what the private doctor, in his office, is to the well-to-do, and the same conscientious, scientific treatment should be given him. If the patient needs a Wassermann test, a fluoroscopic examination, a cystoscopy, or the opinion of a specialist, in order to clear up any doubt as to the diagnosis, he should have it. If he needs a renal function test, or an x-ray search for possible kidney stones, he should have these things.

They are either necessary or they are not necessary. If they are necessary, they should be provided and not postponed, or dismissed with the comment, "Well, we will watch him along for a while; perhaps everything will clear up all right." Some things do clear up all right, but many things do not. You and I would expect to take no such chances if we, ourselves, were ill. Because a man cannot pay for necessary tests and consultations does not mean that he ought to do without them. No man should be allowed to develop an inoperable cancer of the stomach for the want of a fluoroscopic examination, or to develop locomotor ataxia because there was no consultation with the specialist, who would have diagnosed the case as syphilis.

The day when a snap diagnosis could be defended is gone by. The day when one doctor was supposed to "know all there is to know about medicine" has likewise gone by. No doctor worthy of the name can afford to neglect any aid to diagnosis that science can furnish, and, if the doctor in question has not the training to enable him to use such methods, he should at least enlist the aid of someone who has such training. Patients who cannot afford to pay the necessary charges should be sent by the doctor to the dispensary. The dispensaries should be worthy to receive such patients sent them, and should diagnose and treat them in a thorough, scientific manner. We shall not consider, in this article, the capacity such institutions would possess for the teaching of medical

students or as fields for research. Such activities are secondary—the primary consideration should be the patient.

So much for the purpose of the dispensary. Do present methods attain the proper results?

There are various kinds of dispensaries. There are those presuming to treat any type of disease, those restricting their activities to eye diseases, or to maladies of the nose and throat or the ear; there are those which treat only dental cases, those exclusively for women or children, and so on in endless variety.

There are dispensaries which are adjuncts of hospitals and are known as out-patient departments. From these departments patients who require operation or further study are sent into the hospital wards. Patients who need observation or dressings, after their discharge from the wards report to these departments. There are dispensaries which are conducted as separate units, and have no beds at their disposal. Many of these institutions act merely as clearing houses, treating such patients as can come to them for daily visits, and referring those needing bed care to other institutions. Some dispensaries give service without any cost whatever; others make a nominal charge for admission, a charge varying from 15 to 25 cents; some require additional fees for medicine or special dressings. The object of these charges is to make the institution more or less self-supporting. There is another form of dispensary, so-called, which is conducted to make money. Activities of this sort may be known as relief hospitals, clinics of various kinds, dispensaries, infirmaries, or some such descriptive name.

We shall consider only the type which aims to furnish service, not opportunity for profit, and we shall examine them as regards staff, equipment, and administration.

The Staff.—It is the custom in some hospitals for the seniors of the visiting staff to spend at least a little time in the out-patient clinics, but this custom is the exception rather than the rule. It seems to be an accepted theory that the most experienced doctors and those of recognized ability are the ones to whom the care of bed patients should be intrusted. By the same token it is assumed that the out-patients may very well be looked after by recent appointees to the staff, aided by the extern, a recent graduate of the medical school. We do not seem to realize that by far the most important procedure in modern medicine is diagnosis. When the doctor finds out accurately and scientifically what the matter is with the patient, the treatment is comparatively a simple matter. It is in making diagnoses that skill and experience are displayed to their best advantages, and why the out-patient department should be considered a post of minor importance is hard to understand.

A house officer usually begins his hospital training as an extern in the out-patient department. He comes fresh from the medical

school, and without much experience is given the task of treating out-patients. In many hospitals the visiting man is required to see all new cases as a safeguard to the extern's inexperience. In theory this custom is fairly sound, but in practice it is *not*, for the following reason. The visiting man is, as a rule, one of the younger men of the staff. He gives what time he can to his dispensary work. He is unpaid. He is presumed to make his living in his office in the afternoon and to give his mornings to charitable work in the clinic. When does he visit his patients? Not in the evening, surely. Most people want to see their doctor in the morning. The practitioner, therefore, must visit his patients before he comes to the hospital. The result is he comes to the hospital late—sometimes quite late. Sick people should not be kept waiting in the dispensary any more than in their homes—but they are. If the visiting man is one of the younger surgeons, he earns the most of his living by assisting older men in their private work. In many localities private cases are operated on in the morning, and the young assistant finds it difficult to be present on time at the charity clinic. The result of the irregular attendance of visiting men—coming some mornings early, some mornings late, and other mornings not at all—is to throw the bulk of the work on the untrained extern, and the patient is treated accordingly.

The Equipment.—The equipment of the ordinary dispensary is usually inadequate for its responsibilities. A man suffering with indigestion may get a stomach tonic instead of a gastric analysis and bismuth x-ray examination. A man with rheumatism may receive a prescription for salicylate instead of a thorough examination by a dentist, aided by x-ray plates if necessary. If a man with syphilis gets mercury or potassium iodide when he really needs intravenous or intraspinal salvarsan, what is the reason? The reason is that of necessity, the treatment varies according to the equipment provided, and as has been stated, the equipment provided is often quite inadequate for careful, conscientious work. To provide all the apparatus, the laboratories, and to furnish specialists and technicians necessary to operate the apparatus and laboratories, is far beyond the reach, financially, of the ordinary dispensary.

The out-patient departments of large hospitals can use to some extent the consultants, pathologist, laboratories, x-ray departments, and other facilities of the main hospital; but, as a rule, the consultants and these departments of a large hospital (especially the x-ray department) have all the work they can possibly handle in connection with the bed patients, and therefore little time can be devoted to out-patient cases.

The Administration.—Most dispensaries are open but part of the day; some in the morning only, some in the afternoon only, and a few—far too few—are open in the evening. The hours they are

open depend on the convenience of the staff, not of the patients, and for the reason that the staff is a volunteer organization, not a paid one. Unfortunately, however, people are sick in the morning as well as in the afternoon, and not uncommonly in the evening also. A man with a family will suffer a long time before he feels he can afford to give up a half a day's pay to go to the afternoon clinic. A mother with children to feed, dress, and send to school, with the midday meal to buy and cook, will also suffer a long time before she feels able to neglect her household to attend the only available clinic, that in the morning.

Why should the clinic not be open all day and the evening as well? Again the answer is the expense and the unpaid staff.

As a rule, no effort is made to limit the number of patients admitted daily to the clinics. The usual custom is to refuse admission after a stated hour—for example, 10 o'clock or 10:30 o'clock—no matter how many or how few have already entered. This is obviously wrong, for it is better to turn a patient away, unless he be an urgent case, than to admit him to a clinic crowded with twenty patients when there are facilities and personnel to carefully diagnose and treat only fifteen.

The "following up" of patients is one of the most important functions of a dispensary, and yet very few dispensaries foster any such activity. It is not sufficient to treat a married man for gonorrhea or for syphilis. He should be induced to bring his wife to the hospital for examination. This can be accomplished by the use of care and tact, and it has been shown to be a feasible procedure by several dispensaries where such a system is in use. By such means, and by such means only, can we hope for the protection of innocent offspring. It is likewise not sufficient for a dispensary merely to treat a child for pediculosis. The home conditions should be investigated and remedied, if need be; otherwise the child will not remain cured for any length of time.

The "vicious circles" in medicine have been tolerated altogether too long. The prevention of disease is the medicine of the future, just as the cure of disease is the medicine of today. There is no reason why we should not look ahead and begin to plan for the future. It lies within the power of the dispensary—in fact, it is its duty—to show the public the way toward the elimination of the "vicious circles" that have caused the waste of so much time and money in the past. Social disease, industrial disease, as well as the disease of the individual, may be profitably studied in the dispensary and the dispensary should form an excellent base from which to undertake steps toward their elimination.

The Remedy.—Cooperation is the fundamental principle of modern progress. The elimination of waste is a second fundamental principle. Dispensaries should be conducted on business principles,

and the sooner the work of dispensing charity is conducted along business lines, the better it will be for everybody concerned. Expenses could be greatly reduced, the work more thoroughly done, and a greater number of people treated if the following plan were put into operation.

Imagine the community to be represented as a large wheel. At the hub of this wheel there should be a large, completely equipped dispensary, manned by experts in every medical specialty. These men should receive pay. At the end of each spoke, near the rim of the wheel, there should be a small, but complete, branch infirmary, equipped for the simpler forms of out-patient work. This branch should be in charge of a man of wide experience, and he should be aided by one or more assistants. These men should likewise be on salary. These dispensaries should be open the entire day, and the evening as well. They should not be closed on Sundays nor on holidays. It could be arranged that house officers finish, and not begin, their hospital training in these clinics. Clinics limited in their scope—as, for example, gynecological clinics, eye and ear infirmaries, etc.—should be grouped in or about the central dispensary. Patients should be transported from the branches to the central plant by small automobiles operated after the fashion of the jitney bus. A patient needing consultation, bismuth x-ray examination, renal function tests—in fact, any of the more complicated procedures—should be sent at once to the central dispensary. The administration of such a project could be arranged on any standard basis and conducted accordingly.

In presenting this plan there is no intent to overthrow the existing order of things, but is it not feasible to put such a plan into operation in addition to the present facilities, and to allow it to assume gradually its proper proportion? If each existing dispensary would pool a portion of its resources, and contribute a portion of its staff and equipment, the idea could be worked out. It might be possible for one hospital to conduct a branch and a portion of the central plant, and divide the work among existing institutions accordingly. For example, hospital A could conduct branch A and the skin clinic at the central dispensary. Hospital B might conduct branch B and the nose and throat departments at the central dispensary. Hospital C might conduct branch C and the genitourinary department at the central dispensary. It would require broad vision and an unselfish desire for the common good for such cooperation. But the time is ripe, and there is no reason why waste of time and money and human energy should be allowed to persist when modern business methods have shown how to eliminate such waste by a system of cooperation, centralization of plant, and economy of administration.

WHY SHOULD AUTOPSIES BE HELD?—THE ARGUMENT TO BE USED WITH RELATIVES AND FRIENDS.

By MONTROSE T. BURROWS, M.D.,

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The performance of autopsies is an act of interest, not only to medical science, a satisfaction to the physician—knowing thus the more exact cause of death of his patient—but it is also an act of interest and must bring a state of satisfaction to the community at large, because every advance of medical science means an advance for society itself.

In a large number of instances one may obtain permission for autopsies when this fact is made clear to the relatives and friends. In America a very large number of the people are interested in politics and the general social welfare, and, when once informed that an autopsy upon a friend or relative is going to be of aid to the hospital or to the physician or society, they are willing to grant it. Of course there are others who, through religious beliefs and sentiment, shrink from the idea of having an autopsy performed. It is true that there are religious beliefs which prohibit this act. A careful investigation has shown, however, that these are very few and they have a very small membership.

In spite of these facts, the obtaining of permission for autopsies in many of our hospitals has not been most successful. The question arises, "Is not the hospital in part, at least, responsible for this?"

Many of our large hospitals have looked most carefully at their finances and most carefully to the equipment of their wards, but have they expended their best efforts to obtain autopsies? Proper financial backing and an excellent equipment are most essential, but the greatness of that hospital after all is not going to depend so much on its intern quarters as on its expertness in the diagnosis and treatment of disease. When a hospital has neglected this important detail, it cannot expect its wards to be filled with patients nor its halls to be filled with students. The poorest of hospitals have frequently become the greatest institutions. Every kind of effort must be exerted for improving medical conditions in the institutions if it hopes to excel and to be recognized in the community. One means towards this end is to be found in a well-developed autopsy service. To have such a service, the hospital must expend considerable energy. Although a large number of people are interested, very few are well informed

about the methods of medical practice and the essential needs for the advancement of medical knowledge. Medicine has in but few instances heralded broadcast the general scheme by which it works, and there is little reason why it should.

A large number of relatives and friends, before they will grant permission for an autopsy, demand the reasons why they should give it. They wish an authoritative statement; they must be enlightened and persuaded. This is not often so easily accomplished. It requires considerable perseverance, often much more than one can expect from the intern staff unless it is well supported and constantly encouraged by men higher up. Many hospitals have left the obtaining of permissions for autopsies to their interns. This is not to be criticised necessarily when viewed from one direction, because it is true that the intern is often much better acquainted with the patient and his friends and relatives than other members of the staff. On the other hand, the friends and relatives demand an authoritative statement. They are not going to consider the intern an authority when the hospital considers him only a beginner. Several men, when granting an autopsy, have told me they would have granted it before when the intern asked them, but they considered that these men had only an idle curiosity or they were using this means to learn their anatomy. I am for this reason strongly of the opinion that the obtaining of permission for autopsies should be primarily the duty of the physician-in-chief and the hospital superintendent. They may intrust this to the interns, but the responsibility should rest on them.

The intern, in many instances, has interest in the case, but there are many interns who do not. Unless the superintendent and the physician-in-chief take a strong position in this matter, unless they are willing themselves to push it through and thus impress the intern to whom they have intrusted the matter, that intern or the great number of interns will not exert themselves in obtaining a permission.

There are many hospitals abroad which demand that the patient, on his admittance to the hospital, sign permission for his autopsy if he should die. This I do not think need be introduced into our hospitals, no matter how great may be advantage of autopsies. There must be persons who for very good reasons do not want an autopsy performed.

Of course no institution can expect that permissions for autopsies will be granted unless it is able itself to perform those autopsies so that later embalming will in no way be made more difficult. Again, in many instances an autopsy is useless unless a complete examination of the body can be made. Time and again we perform autopsies in the hospital without finding a cause for the death of the patient. In many instances the cause of death is not manifested in

morphological changes. There are always a few, one feels certain, however, in which such manifestations do exist, but they are not found because a complete examination has not been made.

Complete autopsies upon previously embalmed bodies do not interfere with the work of the undertaker. Embalming, on the other hand, prevents a careful and complete examination of many organs as well as it prevents bacteriological and often many possible chemical studies. There is a stage in every autopsy when embalming may be done and not interfere with these studies, and at the same time insure complete preservation of the body. To do this properly, the embalming should be done by the hospital or in the hospital at the time of the autopsy. This can be done with formalin and at a very small expense. Such proceedings are advantageous, not only to the pathologist, but also to the friends and relatives. Many bodies of the poorer families can thus be embalmed, which would otherwise be denied them. This method of performing autopsies has been in use for the last few years in several large hospitals, where it has worked most successfully to the advantage of the institution, to friends and relatives, and to the undertakers having charge of the body.

Although in this paper we have mentioned frequently the advantages and necessity of performing autopsies, we have said little of the actual nature of these advantages. Medical science is far from being exact even in its greatest present-day development. The hospital staff is constantly changing—old men are leaving, new men are taking their places. The clinical symptoms of certain gross lesions are often vague and difficult to appreciate unless they are actually seen and correlated with the pathological changes by the physician himself. In the past it has been only through careful anatomical study that the surgeon has appreciated the conditions which he can cure through operations. Again, it has been only through anatomical study that the physician has clearly associated, for instance, heart murmurs with valvular lesions of that organ. In the same way such studies must form the basis for a further advancement along these lines.

The hospital, like every well-organized institution, must advance through the introduction of careful methods of checking its results of diagnosis and treatment. In many hospitals in this country weekly clinical pathological conferences are held. The purpose of these conferences are to check the clinical diagnosis and treatment with the anatomical findings, to discuss recent literature concerning the case in question and to discuss means for bettering the methods of diagnosis and improving the treatment of the disease.

At Washington University Medical School we conduct such conferences. The cases discussed at these conferences come from the Barnes Hospital and the St. Louis Children's Hospital. Each case

is discussed separately. First, the clinical history is read by the physician. His findings are clearly defined, the treatment that has been given is fully explained together with the clinical diagnosis. Following this a complete description of the autopsy findings is given by the pathologist who performed the autopsy. The pathologist's description is illustrated by lantern slides of both the gross and the microscopical lesions.

Each of these autopsies so presented is also carefully described in writing and illustrated. Such records are filed, so that they are available for subsequent reference. That such records are most valuable to the hospital, there is no doubt, and it seems quite evident, if this is presented in a clear way to the community, they will aid in advancing this means of study. That such response is to be expected has been clearly shown in the recent epidemic of infantile paralysis in a large eastern city. To the health commissioner of that city is due credit of asking that an autopsy be permitted upon all cases dying of this disease in the epidemic that raged in that city a year and a half ago. The friends and relatives granted the permission for an autopsy in every instance, and I had the privilege of performing these autopsies. By this means we were able to follow carefully the treatment of the disease, to find cases occurring in isolated parts of the city among numbers of abortive cases which otherwise would not have been recognized, and to collect data of importance in advancing our knowledge of the disease. In epidemics of this character it is evident that we often know little as to their management, and it is only through such facilities of study that the best results are to be obtained.

The hospitals which have supported their autopsy services have without question been those which have excelled in the diagnosis and treatment of disease, and it has been these which have made the most important contributions to medical science. This fact itself speaks for the advantage of performing autopsies. The best efforts of a hospital should be exerted in this direction, and it is for this reason that I argue that it should be the duty of the whole staff to obtain the permission. The community cannot be expected to help in this unless it is properly and authoritatively informed. Again, it is the duty of that institution to see that these autopsies are complete, so that all the data is obtained which is possible to obtain in the present state of our knowledge.

RHEUMATISM.*

BY WILLIAM E. PREBLE, M.D., Boston.

INTRODUCTION.

The term "rheumatism" is very loosely used to apply, not only to diseases of the joints, but to more or less vague aches and pains in various parts of the body. Physicians frequently speak of rheumatism of the throat, eyes, heart, bowel, etc., referring to infection of these organs, and also apply the term to pains due to such diseases as spinal curvature, sacro-iliac disease, and flat-foot. In the sense that rheumatism is a constitutional infectious disease, there is some basis for using it in connection with the first group of diseases if a streptococcus infection of the throat, eye, etc., is referred to; it should never be applied to the pains due to the second group of diseases. It is still a useful term in explaining to patients arthritis, myositis, and perineuritis, which are diseases due to a subacute or chronic infection about the joints, in the muscles, or about the nerves. Arthritis is a much better term to use in referring to infection in the joints and adjacent tissues.

This paper deals with the disease commonly called "chronic rheumatism," or arthritis deformans, together with the differential diagnosis of diseases with which it might be confused, and the details of treatment of the former disease.

CHRONIC ARTHRITIS AND DIFFERENTIAL DIAGNOSIS.

Gout.—Some physicians still use the terms "chronic rheumatism" and "gout" interchangeably. The two diseases are not at all related etiologically, and differential diagnosis between the two is not difficult. Gout is a very rare disease in this country. Pratt¹ points out that from 1821 to 1916 there were only 41 cases at the Massachusetts General Hospital diagnosed as gout among the 199,518 patients admitted. The exacerbations in chronic gout are much more acute and painful than those of chronic arthritis. The small joints, such as the joints of the fingers and toes, are more apt to be affected, and it is worthy of note that, at some stage, the great toe is usually involved. Gouty tophi may usually be found in the ears, or about the joints or tendons. The uric acid content of the blood is increased, although, according to McCrudden, this is not always the case. Patients with chronic gout are usually beyond middle age, while chronic rheumatism may begin at any time.

*Read before the Berkshire district of the Massachusetts Medical Society, June 27, 1918.

Chronic Gonorrheal Arthritis.—Another disease from which we must differentiate arthritis deformans is chronic gonorrheal arthritis. This is more apt to be monarticular, and the joints most frequently involved are, in order, knee, ankle, wrist, shoulder, and spine (Billings²). Suppuration is prone to occur, and surgery must frequently be resorted to. Myositis—i. e., bacterial invasion of the muscles—is rarely present. There is always a history of gonorrhea, and the focus of infection may often be found in the prostate gland or seminal vesicles of the male, and in the tubes, uterus, or adjacent glands of the female.

Tuberculosis.—Tubercular arthritis, as a rule, is easily differentiated. It is usually monarticular and the spindle-shaped joint is quite characteristic. Suppuration frequently occurs and surgery may be necessary. Myositis is absent. Tubercular arthritis frequently follows trauma and the patient is apt to be quite young.

Charcot Joints.—Charcot joints may readily be differentiated, as they are always associated with tabes dorsalis. These may go on to complete disorganization of the joint, as shown by the x-ray.

Senile Arthritis.—A degenerative form of arthritis occurs in senile patients. The diagnostic points are the age of the patient, the presence of arteriosclerosis, and the absence of myositis. This form of arthritis is probably not due to an infection as are all of the above forms.

Vascular Arthritis.—A sort of pseudo-arthritis occurs in patients with poor circulation, such as cardiacs, nephritics, the obese, etc. This is not a true arthritis, and the pains disappear when the efficiency of the circulation is re-established (Smith³).

Arthritis Deformans.—Arthritis deformans itself is a chronic, constitutional disease with exacerbations and remissions. One of the reasons that so many “cures” for rheumatism continue to exist is because of the fact that if any treatment is continued long enough, when the disease is at the acute stage, it apparently gives relief when the remission occurs.

Arthritis deformans is usually polyarticular, and may begin with simply a little stiffness, or scrappy feeling in the joints. As the disease progresses, the joints become more painful on motion and the tissues thicken up, enlarging the joint. Large joints are usually affected, often symmetrically. The spine is frequently involved. Myositis is a usual accompaniment, and contracture of the muscles is one of the main causes of deformity. The disease, it should be remembered, is constitutional, and profound metabolic disturbances usually accompany it. Atrophy of muscles, anemia, progressive weakness, and nervous disorders are usual accompaniments.

PATHOLOGY.

The etiology of arthritis deformans is an infection having primary, and frequently secondary, foci in tissues at a distance from the involved joints. From the focus, or foci, bacteria, or bacterial emboli, escape and lodge in the joints and surrounding tissues, for which the organisms have a "specific, selective, pathogenic affinity." The bacteria lodge in the small or terminal vessels about the joints, and the first step is proliferation of the endothelial lining of the vessels. Thrombosis occurs, and there may be small hemorrhages into the tissues. A fibrinous exudate is poured out and connective tissue overgrowth occurs (Billings⁴). Adhesions form, and the tissues, which normally slide easily over each other, become matted together, accounting for the stiffness and pain on motion. The circulation and nutrition of the joint and joint tissues are seriously impaired. The infection extends, as a rule, to the neighboring muscles, causing the myositis and subsequent contractures which are so troublesome. The metabolic changes in the joint tissues have been well described by Nichols and Richardson.⁵ The pain may occur only on motion, or it may be very severe even though the joint is at rest. For some unexplained reason the pain is usually worse preceding and during a storm. Some of the patients run a slight temperature in the more acute exacerbations, and a sub-normal temperature with the remissions.

PRIMARY FOCUS OF INFECTION.

A focus of infection is described by Billings as a circumscribed, partially walled-off, infected tissue. In arthritis deformans the offending organism is usually some strain of the streptococcus. The primary focus may theoretically exist in any tissue in the body, but the commoner locations are the tonsils, peridental tissues and accessory sinuses, in the order named. It is a well-established fact that it is impossible, in some cases, for the specialist to determine whether the tonsils are diseased or not before they are removed. They may look perfectly normal and yet harbor infection in the deep crypts. Sometimes pockets of pus may be opened up with a probe, and, again, perfectly innocent-looking tonsils may reveal nothing until they are removed, when a pocket of pus may be found in the deep tissues. Bacteria may be released through the tissues, or by way of the lymph channels, or through the blood vessels. The peridental tissues may likewise be infected without showing anything externally. Pyorrhea that drains freely does not cause rheumatism, but a small pocket of pus at the side of a root or at the apex is a frequent cause of rheumatism. Devitalized teeth are very apt to have apical abscesses and the x-ray is frequently the only means of deciding the point. The same is true

of infection of the accessory sinuses. A patient may give absolutely no clinical signs of the infection, and yet have one or more sinuses full of pus. The x-ray will frequently show increased density even when transillumination reveals nothing. Less common locations for the primary focus are the prostate gland and seminal vesicles of the male, the tubes, uterus, and adjacent glands of the female, pelvis of the kidney, gall bladder, appendix, middle ear, infected hemorrhoids, fistulae that do not drain properly, and chronic abscesses wherever located. It is possible that rheumatism may be caused from an infection in the bowel, but in my opinion the infected area must be partially walled off, as an infected surface having free drainage does not cause rheumatism. Patients with visceral ptosis and intestinal stasis are no more apt to have rheumatism than those whose organs are in their normal positions. Every other possible source of infection should be investigated before resorting to any of the short-circuiting operation.

SECONDARY FOCI.

It must be remembered that there are frequently secondary foci which may keep up the infection even after the primary focus is removed. The presence of these secondary foci accounts for many failures in treatment as they are very easily overlooked. When tonsils are infected the patient frequently has abscesses at the roots of the teeth and vice versa. If one of the accessory sinuses is infected it is quite usual to find adjacent sinuses infected also, even though there are no clinical signs of trouble in the latter.

Secondary foci may exist in distant tissues such as the gall bladder or the appendix. Two of my patients with mild cases of arthritis deformans experienced a complete cessation of rheumatic symptoms after having gall stones removed. It should also be remembered that foci in the joint tissues themselves and in the muscles may be sufficiently vigorous to persist for a long time after the primary focus is removed. The patient does not always have sufficient stamina to kill out these local infections immediately after operation.

TREATMENT OF ARTHRITIS DEFORMANS.

The first step in the treatment of arthritis deformans is to find and remove the primary and all possible secondary foci. The services of various specialists may be required before the source of the infection is located. The tonsils, teeth, and accessory sinuses must always be carefully examined. We may need the services also of a gynecologist or genito-urinary specialist, and the services of a dentist are usually indispensable. As remarked above, x-ray examination of the sinuses and teeth are frequently necessary, even when no external sign of disease is present.

The history of the patient is important. A history of recurring attacks of tonsillitis, even after they have ceased for some years, is always significant. Recurring "colds," particularly if the nasal discharge is unilateral, may be important evidence of chronic sinus infection. Teeth from which the nerves have been extracted, or that have in the past shown evidence of disease at the apices, should always be investigated, and all such diseased teeth must be removed, as treatment through the root canal rarely completely eradicates the infection. Hemorrhoids and anal fistulae should be treated surgically. Urine should be examined in order to reveal any disease along the genito-urinary tract, and the prostate should always be investigated, as this organ may harbor a streptococcus infection which is the cause of the constitutional disease.

When all possible foci are eliminated, usually by surgery, the treatment of the case has but begun. If the joints are very painful and tender, rest in bed for a period of two to four weeks may be necessary, in order to allow the infection to quiet down. The general condition of the patient must not be neglected. Fresh air and hygiene have the same beneficial effect in these cases as in tuberculosis and other chronic diseases. Hydrotherapy may be used with benefit, both locally on the joints and generally in the way of baths. The skin should be kept at its maximum point of efficiency as an excreting organ, in order to assist the kidneys in the elimination of bacterial and metabolic toxins. All possible means should be used to build up the patient's immunity to the infecting organism.

The diet is important. Most of these patients should have a high protein diet in order to supply material for restoring wasted muscles and other tissues. It should be remembered that red meats and acid fruits and vegetables have nothing to do with the etiology of chronic rheumatism. The nutrition of many of these patients is seriously impaired by the dietetic restrictions imposed by some physicians. It is no uncommon occurrence for patients to state that they have eaten no meat, or at least no red meat, for months, following the advice of the family physician, and it would seem that some of our orthopedic friends still cling to the erroneous idea that the disease is related in some way to the ingestion of red meats and acid fruits. If we will but remember that chronic rheumatism is an infectious disease, we will avoid some of the common mistakes when prescribing a diet for these patients.

The carbohydrates and fats should be given in large or small amounts according to the general condition of the patient. We naturally restrict high percentage carbohydrates and such fats as butter and cream, if the patient is obese. On the other hand, if the patient is poorly nourished, or emaciated, these foods should be given freely. Fruit and vegetables should always be given freely

in order to regulate the bowels, and to supply the salts necessary for body chemistry.

A much neglected point is the amount of fluid to be taken. Fluid should be taken freely in order to enable the kidneys to eliminate toxic materials with as little irritation as possible. It is not necessary for the patient to try to drown himself with water and other liquids. Two quarts of fluid daily for the average patient is ample.

Drugs may, or may not, be necessary. The salicylates are valuable for their analgesic properties, and usually relieve the pain, but in severe cases some of the opium derivatives may be necessary temporarily. Tonics such as iron and arsenic should be given, if there is any anemia; in fact, arsenic seems to have a beneficial effect in most of these cases. Carminatives may be necessary to stimulate the appetite. *Nux vomica* and gentian, or hydrochloric acid in the essence of pepsin, are usually effective. In some cases half a glass of porter, five or ten minutes before meals, has a wonderfully stimulating effect on the appetite.

Local treatment of the joints is important, and it is frequently necessary to call in the orthopedic surgeon to prescribe measures for improving the circulation and nutrition of the joints. A very tender spine may require support until the acute symptoms subside. Graduated exercises are usually necessary to stretch adhesions and separate tissues that are matted together, and ankylosed joints may require surgical interference. Vaccines may be useful in assisting the patient in building up his immunity to the organism. Autogenous vaccines, made of cultures from the infected tissues, should be used. Stock vaccines are unscientific and, in my opinion, should never be used. The use of serums has not proved of any great value, and frequently distressing anaphylactic symptoms have followed their administration. Recently foreign proteins such as diphtheria antitoxin and albumoses, proteoses and peptones have been administered to the patients intravenously. Miller and Lusk⁶ have done some work recently along these lines, and Thomas⁷ wrote an interesting article on the subject in 1917.

The details of diagnosis and treatment as outlined above, are illustrated by the following cases:

I.

Case 253. Mr. S., 33 years. Married. Mail carrier and farmer. Referred by Dr. O. B. Head, New Sharon, Maine. Seen December 2, 1913. Weight 151½ lbs. Tonsillectomy 8 years ago. Grippe several times. Rheumatic fever 4 years ago—16 weeks. Has had trouble with joints ever since. Sore all over for past 4 years. Never been free from pain. Shoulders, knees and practically all joints involved. Muscles of legs and forearms seem shortened. Gave up all work nine months ago. Joints swell and then subside. Feels feverish at times. Has been following a diet without meat for nearly a year. Walks partially stooped-over, using a cane. Had to be helped on to examining

table. Motion of shoulders, elbows and other joints considerably limited because of pain.

Physical examination essentially negative except slight tenderness over left antrum. Patient says he has neuralgia on that side.

Patient was referred to Dr. C. R. C. Borden for examination of nose, throat, and sinuses.

Dr. Borden reports right antrum diseased and left tonsil fibrous.

Patient was referred to Dr. A. W. George for x-ray which confirmed Dr. Borden's findings.

December 3, 1913, patient operated by Dr. Borden. Right antrum full of detritus. Tonsils removed—one of them diseased.

Patient given directions in regard to diet, with plenty of meat, fruit, and vegetables, and exercises to limber up the stiffened joints.

March 18, 1914. Patient reported by letter. Weight 167 lbs. General health much better.

October 6, 1914. Did a man's work all summer. Milks six cows twice daily, and does the usual farm work. Some pain in right knee and left arm.

II.

Case 1593. Mrs. D., 64 years. Married. Referred by Dr. D. C. Norton, Manchester, N. H. Seen January 27, 1918.

History.—Tonsillitis frequently for years, in her thirties. Nervous breakdown and acute Bright's disease 20 years ago. Has had heart trouble for 12 or 15 years and acute dilatation 3 years ago. Has had rheumatism off and on for 35 years, and many attacks of sciatica. Knees stiff and won't straighten. Back is stiff. Teeth out 3 years ago and had no rheumatism for 3 months, then it returned. Gets acute attacks of sciatica and thinks she has fever at these times. Has sudden attacks of palpitation, with very high pulse—180-200, which continues for 4 or 5 hours, occasionally longer. Occasionally gets terrible pains in arms, coming on suddenly and going gradually. Has spent 3 or 4 days a week in bed for the past 4 years. Takes morphine for pain, as aspirin does not relieve.

Physical Examination.—Pulse, 100. Temperature, 98.4°. Blood pressure, systolic 180, diastolic 110. Very emaciated, pale. Moves head but very little in any direction. Neck stiff. Tonsillar glands enlarged. Tonsils small, red, with redness of anterior pillars in front of them. Pulses irregular. Peripheral arteries considerably thickened. Heart much dilated and hypertrophied, with frequent extrasystoles. Soft blowing systolic murmur at apex with a loud presystolic roll and presystolic thrill. Liver 3 cm. below costal margin. Extremities—knee-jerks lively, no edema, considerable fluid in both knee-joints, patellae fixed and mobility much limited. Tender along course of both sciatic nerves and along spine in lumbar region and lower dorsal with limitation of motion. Urine shows slight trace of albumin with rare hyaline cast.

Diagnosis.—Infectious arthritis. Chronic tonsillitis. Mitral regurgitation. Mitral stenosis. Myocardial disease with hypertrophy and dilatation of heart. Paroxysmal tachycardia. Chronic nephritis.

February 11, 1918. Tonsillectomy by Dr. George L. Tobey, Jr. Right tonsil full of pus pockets. Tonsils given to Dr. Sanborn for culture and for preparation of an autogenous vaccine. Patient off table in good condition.

February 15, 1918. Dr. Foster Kellogg called in consultation because of leucorrhoea. Made diagnosis of senile vaginitis.

June 24, 1918 (4½ months after operation). Report by patient's daughter. Patient has had one slight attack of rheumatism in left leg since operation. Has been up every day since leaving hospital, goes up and down stairs to meals and has no pain except some in her knees, if she walks too much.

Dr. Sanborn reports two strains of streptococcus obtained from the tonsils. At the present time Dr. Sanborn is giving vaccines made from cultures from the tonsils.

III.

Case 1721. Mr. E., 64 years. Married. Referred by Dr. W. R. MacAusland. Seen April 31, 1918. Weight 194 lbs.

History.—Does not recollect ever having any throat trouble, but has frequent and quite severe "colds." Has had a little rheumatism for 15 or 20 years. At the present time has pain and stiffness in shoulders and elbows, back, and down legs. In April, 1917, consulted Dr. MacAusland for very acute hypertrophic arthritis of spine. Sinuses were x-rayed and found negative. Throat was examined by Dr. D. Harold Walker, who reported tonsils suspicious. X-ray of teeth showed absorption of alveolar process. X-ray of spine showed marked hypertrophic process of spine and sacroiliac region and lipping on lateral view. Treated by mechanical support. Patient is somewhat better but motion is limited. Six weeks ago began vaccine treatment for recurring "colds" and began to have pains in shoulders, thighs, knees, back, etc. Went down South but got no relief.

Physical Examination.—Pulse 60. Temperature 98.2°. Blood pressure, systolic 200, diastolic 160. Teeth, has but three left, all loose. Throat, tonsils large, soft and exudate can be expressed from a crypt on the left. Peripheral arteries much thickened. Heart, slightly enlarged, regular, first sound replaced by faint blowing murmur at apex. Liver, 8 cm. below costal margin. Extremities, slight edema of shins to knees. Rectal, prostate rather large, smooth, not tender. Urine shows large trace of albumin with rare hyaline cast. Three glass test negative.

Diagnosis.—Infectious arthritis. Chronic tonsillitis. Chronic gingivitis. Mitral regurgitation, with hypertrophy and slight dilatation of heart, not entirely compensated. Chronic nephritis. Arteriosclerosis.

May 21, 1918. Entered the Brooks Hospital in the forenoon. Was put on house diet, with ice cream, orange juice and Celestin's Vichy added.

May 22, 1918. Tonsillectomy by Dr. George L. Tobey, Jr. Three teeth extracted by Dr. Bradford. Convalescence was uneventful.

June 25, 1918. Weight 180 lbs. Pulse 68. Blood pressure 140. Feels much better. Back is all right, so that he can play golf. Still has a little stiffness in arms. Legs are all right. Feels very well. "Can do things he couldn't do before," such as drive his auto, etc.

Advised to take no medicine, avoid any strenuous exercise, and report in 3 months.

The tonsils and teeth were sent to Dr. Sanborn, who reports two strains of streptococcus, and staphylococcus aureus. Patient is not being given vaccines because he seems to be getting along very well without them.

August 2, 1918. Improvement continues.

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RESPONSIBILITY AND THE PUBLIC HEALTH.

By D. M. LEWIS, M.D., New Haven, Conn.

That responsibility for the public health is not accurately defined, that it is not correctly applied, and that the so-called social hurricane of health insurance is a consequent result, is very apparently unappreciated by health authorities and consequently by social reformers. How such comes to pass is not difficult to show, when the question is studied from a critical view-point, afforded by a knowledge of public health workings. The answer, in general, is that given by a State Commissioner of Health in an address before the Connecticut State Medical Association this year, to the question, "Why should the medical profession allow the laity to lead in this matter—why should we sit calmly by until public health legislation is forced on us?" The answer was, "Too late—we lost a great deal when we ignored the possibilities of the logical development of mental therapy, and allowed Mary Baker Eddy to preempt the field. Certainly we lost a great deal as a profession when we overlooked the value of intelligent and persistent massage, and allowed the osteopath to capture it." I cannot agree though to his conclusion "Too late—it isn't a choice of what we want to do, we must thin out and spread out, and turn things upside down, and it would be wise if we take it in our own hands and do it before without having some civil administrator thrust it on us willy-nilly."

We do not have to turn things *upside down*—it is a matter of turning things *right side up*. Why and how?

Why? Socialized medicine has demonstrated the new public health as the need of delivering physical fitness to individuals, in terms of existing deformities like dental caries, and adenoids, contrasting it with the old public health, which may have noted these conditions, but was powerless to compel the correction. In other words the nation owes it to itself to see that all its citizens are physically fit. In this, then, we have a part of the paternal system of that efficient country where the people are made for the State; that country with whom we are at war; that country whose methods must be destroyed to make the world safe for democracy. A part of that paternal system compels you daily to NOT have on your premises or place on others premises or in public places any inflammable material like paper, or wood—not to make you a responsible individual, but to prevent you from causing a fire hazard. They, the authorities, make and keep themselves responsible. To go back to our theme, socialized medicine is in order because

" . . . the larger percent of individuals do not apply for medical science until it is too late to do anything about it;" ". . . that it will always be so as long as the individual has the initiative;" ". . . that only the rich and the very poor can have the benefit of true medical science." If now we examine the "Standardized Public Health" of today, expressed, as it most frequently is in print, as the Board of Health of New York City, we shall find material for thought and weighing. The weekly bulletin for June 1, 1918, leads with an article on Health Instruction, Past and Present. The past of fifty years previously, vastly different,, laid emphasis on "sanitary matters," the provision of pure water supplies, construction of sewerage systems, grading and cleaning of streets, control of offensive trades, supervision of privies, cesspools, drains, etc. In addition a limited control of disease. Nothing was then known about bacteria. When the epoch making discoveries of bacteriology came, it was realized that much effort on the part of health authorities would be lost unless the people were taught the nature of tuberculosis, typhoid, and diphtheria; otherwise the people would keep to the older conception of diseases. Publicity now meant increasing public education; as against the old days, when improvement could be made in the health by administrative action, now the cooperation of an intelligent public was an indispensable necessity for further improvements. A policy of liberal education of the public in all health matters is announced and the aid and cooperation of all is earnestly requested. The bulletin for June 15, 1918, is worth reading; a Health Drive, a contribution like that of the Red Cross, etc., plans out one week's activities. Sunday has five simple rules of maintaining health; clean up dumps, remove all rubbish, clean out closets, attics, and cellars of useless articles, whitewash dark places, and remove insanitary accumulations where lurk the germs which may cause serious or fatal diseases. Monday is a day of lectures in schools on necessity of cleanliness and good food. Then follow three days on transportation, correction aid given by patrolmen and street cleaning day, followed by fly day. The announcement of this drive in the May 25th bulletin states that "the purpose of this drive is to rid the city of the obvious and readily discoverable causes of disease; the dump heaps, rubbish piles, useless articles stored in attics and cellars causing insanitary accumulations incidental to carelessness or neglect where may lurk germs of serious illness."

Analysis of these two articles show definitely first, that education of the public is not even in as good terms of public health as the old public health stood for, and, secondly, that the responsibility for the obvious and readily discoverable causes of disease are not only laid on the people, but this is done after any possible damage has been operative.

If now we take stock of the manner of controlling diseases, as well as the educational propaganda on the same, we find that, with one exception only, all communicable diseases are cared for from the standpoint of reported or found cases, although the cause as human carrier is known. Conversely the lack of control cannot be had, because of lack of responsibility of physicians and laity for not reporting cases. So, finding a method of demonstrating those individuals who are susceptible to the disease and in analogy with the vaccination against smallpox as preventive in immunization by toxin-antitoxin, the responsibility is again placed on the individuals, who will not be so educated through lectures or press for the absence of control of the disease. All infection, primarily, starts from the one ill of the disease and responsibility is laid on the public. The one exception that we made is in the case of typhoid fever. The recognition of carriers, and especially the actual demonstration of the cases like Typhoid Mary, has resulted in one procedure that should be borne in mind; the constant search among the populace, especially in milk and food handlers, for carriers. Here then is the first manifestation of responsibility on the part of the health authorities for the frequency of a disease. Their pride in the results of the past two years is more than merited, it is rational.

If we examine the evidence of how this came about for typhoid, while it is done for no other of the reportable diseases, we shall find that field work demonstrated Typhoid Mary; in the other diseases the laboratory diagnosis of the mere presence of infecting organism is used to the exclusion of similar medical demonstration in the proving of carriers, rather than as a corroboration by the laboratory link.

A second illustration is the August, 1918, Bulletin of the North Carolina State Board of Health. On the responsibility for typhoid fever the writer states that open back privies and flies are responsible. As to who is responsible, the answer is the County Commissioners, inasmuch as the larger part of the state is rural, and the commissioners are responsible for rural property and life. Responsible because they could prevent it by a method cheap and simple; the employment of a county physician with newspaper notices advertising free vaccination. The end result is then responsibility laid on the rural inhabitants. Yet, contained in the same issue, is an unsigned letter of a county health officer stating that the State Health Department is the responsible party. Of note, the caption of the article states that this county health officer is right.

Wherever we look, in state or larger municipal bulletins, there are always in evidence the two factors; the responsibility for the frequency even for mortality from diseases, is laid on the populace or physicians, the cure is by education of the people of how the

disease arises and cooperation asked by reporting cases, or because vaccination against a disease is excellent emergency treatment of epidemics, vaccination is advised in an increasing number of diseases, from analogy with some other known disease. One other factor is of import. The public health propagandist is, almost without exception, a product of the laboratory or a sanitary expert without equivalent clinical knowledge of medical diseases. From such a standpoint, increased frequency of diseases in terms of epidemics have a causative factor in the sanitary surroundings of the patients. With infants and small children milk is immediately investigated, while with older children and adults every known species of insect or animal becomes a target. An investigation is not carried to the bedside of the patient and to the neighboring children—it is carried back to old times. The end result of all factors combine to make yet more education not alone of the people but of the small fry of health departments. One and two months after such an article appears in a metropolitan bulletin it appears as an original article in our little bulletin. Of further import is the original article of the small fry. Under the caption of Dairy Farm Inspection in the New Haven Board of Health Bulletin for June, 1918, appears an excellent article taken from the Bureau of Animal Industry in Washington; there follows the description of the work done by the farm inspection as showing how closely such an article is followed. None of the activities of such inspection have a single bearing on the introductory article.

A yet unstudied point of view of error of popular education is hidden under that now famous motto, "Public Health is Purchasable." Because communities had smaller amounts of money appropriated than was standard, lack of control of disease as well as all other activities was reasonably excused. Additional amounts brought about a standard of activities irrespective of study of the problems of the community, directly forcing one main issue. Broad educational lines extend from the office chair of the administrator directly to heads of departments, over the working force. Is it to be wondered at that within a month after such is brought about, even the worker becomes an educator? When such standardizations of state or municipal boards take place they are carried out by political bodies; as a consequence the previous incompetent incumbent is carried along as the head, for political reasons.

The "Why," then, is answered, "Lack of responsibility of boards of health," both in not assuming it, and, in general, of a system of education based on theory.

How to turn things right side up rather than to immediately assume "willy nilly" socialized medicine embraces more than the reverse of the "why." Assumption of responsibility by New York City for typhoid fever has gained the theoretical results required.

I have shown the same true of typhoid in this city as well as with diphtheria and scarlet fever. The added point is that it has not been gained by public education, but by the accurate work of trained health workers in the pursuit of the work for which they are hired. The solving of these problems has been the rational application of scientific medical observations in the field previously under the direction of skilled non-medical workers. Extension of this work into the field of infant mortality has given the results expected; its extension to all the diseases that are infectious and communicable are more than logically proper for an added reason. Sufficient literature on our general respiratory diseases has now accumulated from both army and civilian observations to show that the unstudied clinical side will explain the unreached results of a one-sided laboratory study. The localization of the causers of diseases, *irrespective of cases*, is the basis of true responsibility. That it will do more than control the diseases is as yet unappreciated; it, directly, has to deal with that careless and ignorant class in the majority, who are unreached by public education as practiced, and it can demonstrate the prevention of minor inflammatory respiratory infections among the infants and younger children of such individuals. The actual prevention of the deformities of school and later age, which today are the measures of necessity of socialized medicine, lies in the prevention of infections of the first few years of life. This is possible with direct responsibility of boards of health, under the system of scientific clinical medicine applied in the field, corroborated or labelled by the laboratory; the results expected of public health may be obtained by placing the laboratory in the same position that it holds in internal medicine, a link, not the controller. The public health itself is an exact science after the manner of all other exact sciences, namely that there are laws of nature as in other sciences, that the interdependence of all health activities can be demonstrated, as under such laws, when based on controlled observations and experiment, as in the physical sciences.

Until we can control the results there can be no "standard." Control may be had when the observations and experiments are extended to the field under the same intensive work as applied, without full solution, in the laboratory. Because Nature herself provides the experiments, the solution is the more easily made. The conduction of such a science does more than the theory of socialized medicine. It has regard for, and is not destructive of, the art of medicine; it demonstrates, not the efficiency of making the people fit for the state, but makes effective the essential privileges assumed and reasonable for a free and independent people.

Simpler than continuance of, and extension of, theorized socialized medicine by organizations, including often boards of health themselves, should be the application of responsibility by such

boards of health. This demand should be pressed by all other organizations and by the individual at large. Otherwise we are falling directly into that system, part of the perfection of efficiency against which we are now fighting as intolerable and against the principles of true freedom.

In sum, practical experience in the hitherto unexplored field work of public health can demonstrate from the results gotten, from the observations made, that such is the basis of a true sanitary science; that it, like internal medicine, has as its aids, the laboratory and statistics; that in assuming true responsibility it can fulfill the tenets of a true science, as opposed to the failures of theory consequent on irresponsibility. Personally, I protest against the irresponsibility of the present day "standardized public health methods" as directly the cause of and favoring the spread of socialized medicine.

CURRENT NOTES

The Southern Medical Association Meeting.

The Southern Medical Association Annual Meeting will be held at Asheville, N. C., November 11 to 14. We want to impress on our readers the advantages, professional, social, and physical which would accrue to themselves and to their families from a visit to this famous and beautiful health resort on such an occasion. General Hospital No. 12 has been located at Asheville in the modern tourist hotel, Kenilworth Inn, which was at the time in the process of building, and about 60 percent complete when this decision was reached by the Government. It has just been finished and is now housing over three hundred men, a number of them from the battle front in France.

Six miles from Asheville on a paved road at Azalea, the Government has a great sanatorium of 1,000 capacity, over 90 percent complete, 68 great buildings; and announcement has just been made that a 500-bed addition is to be constructed at an added cost of \$400,000. The total cost of the original 1,000-bed capacity plant and the 500-bed addition will be \$2,000,000.

At Waynesville, thirty miles west of Asheville, in Haywood County, is another hospital with 400-bed capacity, for sick and wounded soldiers.

The Germans are being removed from the camp at Hot Springs, forty-nine miles west of Asheville, on the main line of the Southern Railway between Asheville and Knoxville, and this plant, with its 2,600 capacity, will be remodeled into a splendid hospital for wounded and sick soldiers from the battle fields of France at a cost of perhaps \$500,000, or more. The roads in this section are in wonderfully good condition, making motor trips to the different hospitals in the vicinity a genuine delight.

Those who have been there already know of Asheville's hospitality and generous welcome. Asheville continues to say, "The more the merrier."

Massage as a Profession for Blind Soldiers.

Three Canadian ex-soldiers who were blinded overseas in the service of the empire received their diplomas from McGill University as having successfully passed the examination in massage. These men are qualified now to practice massage professionally. They are Pte. Peter Donaldson, 114 Prudent street, Fort William; Pte. L. B. Hopkins, Stavely, Alta., and Pte. J. E. Sterling, Maitland, N. S.

The course of training through which these men have passed during the past year was given at the Halifax School for the Blind, where they were placed by the vocational branch of the department of soldiers civil re-establishment.

"It is of interest to note," stated Mr. W. E. Segsworth, administrator of the vocational branch, "that before the war Donaldson was a clerk, Hopkins a station agent, and Sterling was a train conductor. The success which the department has had in fitting these men for a new occupation where their war disability is no handicap is typical of the purpose and aims of the government in dealing with disabled men. I may say that although these men have graduated and are now qualified to practice, we are going to give them a further post-graduate course at the large hospitals in Montreal, because it

is our intention in the case of blinded men to spare no effort to insure their success in life.

"It was during the course of their training that the Halifax disaster occurred and over 1,600 treatments to victims of that disaster were administered to by Donaldson, Hopkins, and Sterling. Many of the people treated owe the present use of their limbs to their efficiency.—Communicated by G. Leininger, Chicago.

Severe Penalties Under Prevention of Blindness Law.

On Friday, September 6th, two midwives were prosecuted before Judge Fry in the Municipal Court for failure to observe the requirements of the Act for the Prevention of Blindness from ophthalmia neonatorum. Both were convicted, and the minimum fine of \$10 was imposed in each case, as it was their first offense.

The Act for the Prevention of Blindness in Babies requires that all physicians, nurses, and midwives who assist any woman at childbirth, or at any time within two weeks after childbirth, shall report within six hours, to the local health authorities, any diseased condition of the eyes of an infant. Seventeen schools for the blind throughout the country report that 25 percent of their blindness is due to failure to secure prompt and effective treatment for the cases of ophthalmia neonatorum. This does not include the many additional cases of partial impairment of vision.

According to the report of the Illinois Society for the Prevention of Blindness, Mrs. Tillie Wysinska, a midwife at 2214 North Leavitt St., attended Mrs. Frank Mozuch, 1953 Webster Ave., at the birth of her son, Chester. She failed to use the prophylactic furnished free by the Department of Health. When his eyes became inflamed the third day, Mrs. Wysinska directed the mother to bathe them with breast milk, saying it was a cold, and failed to report the case. Two weeks later the baby was taken to the Cook County Hospital, where it was found to be suffering from a purulent ophthalmia and ulceration of both corneae had taken place. The baby has permanent scars on each eye which will seriously impair his vision.

Mrs. A. Centello, 1534 McHenry St., another midwife, attended at the birth of Alice Kzowski, whose mother lives at 1323 Julian St. When the inflammation appeared the third day, she also pronounced it only a "cold in the eyes" and did not report it to the Department of Health in the City Hall. Careful treatment at the Central Free Dispensary of Rush Medical College, and by a visiting nurse, has saved the baby's eyes from suffering from the midwife's neglect.

A vigorous prosecution of midwives and physicians who do not observe the requirements of the law in the care of the eyes of the new-born has been begun by Attorney General E. J. Brundage through his assistant, Charles E. Bartlett.

Utilization of Platinum in Unused Instruments.

In view of the limited supply of platinum in the country and of the urgent demand for war purposes, it is requested that every doctor and dentist in the country go carefully over his instruments and pick out EVERY SCRAP OF PLATINUM that is not absolutely essential to his work. These scraps, however small and in whatever condition, should reach Governmental sources without delay, through one of two channels:

(a) They can be given to proper accredited representatives of the Red Cross who will shortly make a canvas for that purpose.

(b) They may be sold to the Government through any bank under the supervision of the Federal Reserve Board. Such banks will receive and pay current prices for platinum.

By giving this immediate attention you will definitely aid in the war program.

It is recognized that certain dental and surgical instruments requiring platinum are necessary, and from time to time platinum is released for that purpose. It is hoped, however, that every physician and every dentist will use substitutes for platinum for such purposes wherever possible.

YOU ARE WARNED against giving your scrap platinum to anyone who calls at your office without full assurance that that individual is authorized to represent the Red Cross in the matter.—From the Chief of Section of Medical Industry, War Industries Board.

Blood Non-Protein Nitrogen in Kidney Disease.

Drs. John H. Larkin and I. J. Levy* discuss the interpretation of urea and non-protein nitrogen estimation in the blood in various kidney lesions. Their paper is a preliminary report.

At the outset they mention four extrarenal factors which affect these estimations and which must be taken into account. These are: first and most important, the diet; second, certain ill-understood metabolic conditions; third, in edema with marked diuresis, there is a tendency towards nitrogen accumulation in the blood; fourth, just before death (from 24 to 48 hours) there is sometimes a nitrogen accumulation, irrespective of the type of the kidney lesion, and even in cases with fairly normal kidneys.

By pointing out the pathologic ambiguity of such terms as "interstitial nephritis," which may be, essentially, either inflammatory or arterial in origin, with corresponding differences in the chemical condition of the blood, Larkin and Levy explain their adoption of the more precise classification of Vollhart and Fahr. This recognizes three distinct pathologic types. *First*, the glomerular; *second*, the arterial; *third*, the tubular.

Acute glomerulitis is a distinct clinical entity, with a true inflammatory reaction in the glomerulus. Usually this condition ends in repair. If the glomerular lesion is beyond repair, it goes on to chronic glomerulitis, the onset of which may be acute and its course rapid, or it may commence insidiously and not reveal itself openly for years. Most of these cases die of true uremia. The bloodvessels become *secondarily* involved and the resulting arteriosclerosis leads to *secondary* interstitial and tubular changes. When these last are marked we have "secondary contracted kidney."

In the arteriosclerotic kidney, the changes are primarily vascular, the involvement of the glomeruli and parenchyma is secondary. The result is "primary contracted kidney." The kidney lesion is not the direct cause of death, which results, usually, from the arteriosclerosis, heart failure, apoplexy, or an intercurrent affection.

In the tubular, or nephrotic kidney, the primary focus of involvement is in the convoluted tubules. The clinical symptoms are extrarenal in origin. Most cases of "parenchymatous nephritis" come under this head. The authors present a large number of case reports with blood findings and pathologic and histologic findings at the autopsy.

They summarize as follows:

1. All cases of true uremia give high nitrogen figures in the blood.
2. Acute glomerulitis gives normal readings.

*Larkin, John H. and Levy, T. J.: The Interpretation of Urea and Non-protein Nitrogen Estimations (Internat. Clin. Ser. 26, II, p. 26).

3. Chronic glomerulitis during the period of kidney efficiency gives normal readings. An increased blood nitrogen in the course of chronic glomerulitis is a bad prognostic point.
4. So-called eclamptic uremia in the course of acute glomerulitis gives a normal blood nitrogen; when occurring in chronic glomerulitis, the blood nitrogen is high.
5. The arteriosclerotic kidney, in the course of the disease shows no blood nitrogen retention. In the markedly arteriosclerotic kidneys, there is a definite increase of blood nitrogen a month (perhaps sooner) before death.
6. Increased nitrogen readings, of no diagnostic importance, may occur 24 to 48 hours before death.
7. In the so-called nephrotic kidney, characterized by much edema, the blood gives normal nitrogen readings.
8. Extrarenal factors are of paramount importance in interpreting nitrogen readings in the blood.

It is to be noted that in none of the cases reported and analyzed were both the urea and the rest nitrogen estimated. Though experience tends to show that when the diet and the water intake and outgo are known, either of these figures may replace the other for calculation purposes, it is precisely in such a carefully examined series that it would have been worth while to establish the correlation.

It is also regrettable that the (approximate) nitrogen intake was not given and compared with the urine-nitrogen outgo. As the authors set out to prove the value of the blood-nitrogen estimations, it would have seemed obvious that they would have sought to show that, in their cases, the much more easily made urine estimations would not have sufficed.

The Disappointments of Vaccine Therapy.

The value of prophylactic vaccination has long been firmly established, but in regard to the efficacy of vaccination as a curative agent there is today considerable difference of opinion, and for many who have given this treatment a prolonged trial the results do not satisfy their earlier hopes and expectations.

Experience of Dermatologists.—As has often been the case with new remedies, dermatology was one of the earliest fields for the trial of curative vaccines; and there are two affections of the skin, of microbic origin and difficult to cure, in the successful treatment of which vaccine therapy at one time seemed likely to be of great assistance. These two affections are *chronic staphylococcic infections* and *lupus vulgaris*.

Experience extending over a dozen years has shown that this early promise has not been fulfilled. It is probably true to say that most dermatologists will, perhaps, as a last resort, employ vaccines, but will hesitate, since it is not possible to predict with any certainty that the patient will eventually be benefited, and anticipation of a cure will generally be in inverse proportion to their experience of the treatment. Personally, always with an intense desire to see good results from vaccine treatment in these obstinate cases of chronic staphylococcal infection, Adamson has been so unfortunate as to have but rarely met with them either in very numerous cases treated by himself or in his own cases treated by expert bacteriologists.

Striking cures are, indeed, reported, and it must be admitted that good results are occasionally observed with vaccine treatment in the less chronic forms of

staphylococcal infection of the skin, in recent furunculosis, and in pustular acne which is not of long standing; but such results are by no means constant, and in the majority of cases there will be but temporary improvement, if really any improvement that cannot be attributed to other treatment carried out at the same time or to accidental coincidence with the natural course of events. In some cases the eruption will become worse.

And, again, it is certainly correct to say that most dermatologists will not now recommend tuberculin treatment as a likely cure for lupus vulgaris, and that many will avoid it as being fraught with danger. In Adamson's own experiences, in every case of lupus treated by tuberculin the disease has subsequently become less controllable than before the treatment was used.

Experience in Other Fields of Medicine.—If we compare the experience of dermatologists with that of others in other fields, we find much the same opinions to prevail. From a perusal of the reports of the discussions on vaccine therapy which took place at meetings of the Royal Society of Medicine in 1910 and in 1914 we gather that although this treatment may now and then appear to give dramatically successful results, it more often fails, and sometimes does harm.

Sir Thomas Horder summed up the opinion of many when he said that "the failures of vaccine treatment are more frequent than its successes."

In respect of the value of vaccine treatment in enteric fever, in gonorrhea, and in ulcerative endocarditis, there are differences of opinion, and many observers have expressed themselves as dissatisfied with the results in these affections.

In connection with the treatment of septic wounds of war curative vaccine therapy has proved of comparatively little value, and Colonel Sir Almroth Wright seems to admit that it takes but a secondary place compared with preventive vaccination, for he remarks today in regard to the treatment of wounds that—

"Prophylactic employment of vaccines is not only from the theoretical point of view the best of all methods of employing vaccines, but it is also the method which gives in practice the maximum advantage."

And again he writes—

"Treatment by physiological methods . . . procedures such as the opening and draining of the wound . . . is beyond all comparison the most important, and I would admit that—all loud talk notwithstanding—antiseptic treatment is at the best an ancillary method of treatment. And, of course," he adds, "the same applies also to treatment by vaccines."

These statements appear to indicate a distinct recession from the opinion, which he expressed in 1909, that—

"The principle of building up the resisting power of the system against any microbe which may have entered the body will ultimately hold its own even against the principle of warding off infection from the susceptible patient."

Today prophylactic vaccination "is the best of all methods of employing vaccines," and "treatment by vaccines" "at the best an ancillary method," "all loud talk notwithstanding."

Consideration of Comparative Failure of Curative Vaccination.—How are we to account for this comparative failure of curative vaccination as contrasted with the striking success of prophylactic vaccination? Is it not that in prophylactic vaccination we are dealing with a less intricate problem and a proceeding which is better supported by known facts than that which confronts us when we attempt to cure an already existing infection by means of vaccines?

It is easy to see that *preventive* vaccination has a sound foundation. The study of immunity reactions has established the general principle that when

an animal becomes infected by a micro-organism it is rendered, after a period of incubation, specifically supersensitized to the toxins of that microorganism—to use the expression of Von Pirquet, a condition of allergy or altered reactivity is produced. As a result of this allergic condition the animal is protected against a second infection. An attempt to produce a second infection gives rise to a reaction more violent than the reaction to the first infection, which has a shorter incubation period and which ends in spontaneous cure. The efficacy of prophylactic vaccination is demonstrated in the results of preventive vaccination against smallpox and against enteric fever.

But when we come to the cure of an already present infection we have altogether different conditions. The protection which has been acquired against a second infection varies in degree and in the length of time it endures in different diseases. In ceratin infections the reaction is such that the infected organism completely overcomes the invasion and remains henceforth protected against the disease. This occurs in smallpox and in scarlet fever, among other complaints.

In a second class the patient, although prprotected against a second invasion from without, yet remains infected and is liable to new infections from within—that is, to autoinoculations. This occurs in tuberculosis and in syphilis.

In a third class the protection is apparently of but short duration and seems often to be followed by a perpiod of increased susceptibility, so that new infections may easily take place. This is seen in streptococcal and in staphylococcal infections and in influenza, for example.

What we require to know in regard to the second and third of these classes is whether in a subject whose immunity development has been insufficient completely to overcome the infection we can by appropriate doses of vaccines so enhance the production of immune bodies—i. e., so “build up” the resisting power of the system against a microbe which has entered the body—that the defeat of the invasion is assisted or completed; and whether we can do this without danger of disorganizing the mechanism of immunity and possibly lowering instead of raising the powers of resistance.

Production of Protective Bodies.—The early promise of Wright’s method of curative vaccination was that we could avoid the danger of overstimulation and its risks of fresh infection, such as we became familiar with in the early days of treatment by Koch’s old tuberculin, by regulation of the dosage, and that we were able to enhance the production of protective bodies without so disturbing the mechanism of immunity as to do harm.

This method was based upon the hypothesis—

“That the blood of those who become the subject of a bacterial invasion is deficient in protective substances,” and “that by an injection of corresponding bacterial vaccines the content of the blood in protective substances can in practically all cases be increased.”

These protective substances were “hypothetical substances in the serum which incite phagocytosis by action on bacteria”—i. e., opsonins. It was further maintained that the measure of the production of protective substances could be gauged by the observation of the opsonic index and the appropriate doses of vaccine measured accordingly.

This hypothesis is exceedingly simple, and if it expressed the whole problem of immunity vaccine treatment would be a straightforward proceeding. But in reality it is simple because it ignores a good many facts and current ideas in regard to immunity production.

It ignores the teaching that an infected organism develops specific immune bodies as a consequence of becoming infected, for according to Wright a patient suffering from an infection, such as lupus vulgaris, has a lower “opsonic index” than a normal uninfected person—that is to say, he has less protective

substances in his blood. But according to the more generally accepted view a patient with lupus vulgaris is protected against fresh infection because he has acquired protective bodies which are absent in the normal person. Although the average "opsonic index" of lupus cases has been found to be 25 percent. below normal, yet every case of lupus gives a "cuti-reaction" to tuberculin, and thus indicates a body content of protective substances above the normal.

Again, in cases of enteric fever agglutinins are present in the blood which are absent or deficient in the normal. Yet the hypothesis of Wright supposes the blood of the enteric patient to be deficient in protective substances.

But although the hypothesis of Wright seems totally to ignore the teaching that an infected person develops protective bodies as a result of infection, it yet supposes that these bodies can be developed as a result of vaccination, an attitude which seems contradictory.

It is doubtless perfectly true that the immunity reactions may be stimulated by vaccination, but we must not lose sight of the fact that a person who has been infected is in a state of allergy or altered reactivity or hypersensitiveness towards the toxins or microorganisms by which he is infected, so that the reaction which may result from even a minute dose of vaccine may be enormous in proportion to that which would occur from the same dose in an uninfected person, and that such an excessive reaction may be followed by a period of exhaustion of immunity or "anergy." And this seems to be the danger of the proceeding of so-called curative vaccination, that we cannot estimate the result of a vaccine in an already infected subject. The minutest dose of vaccine may set up in an infected subject an explosive reaction whose force we are quite unable to predict or control.

The Opsonic Index.—According to Sir Almroth Wright's hypothesis the proper dose of a vaccine may be estimated by the opsonic index. But this hypothesis ignores the fact that in many infections the polynuclear leucocytes or phagocytes take little, if any, part in the defence against the invading micro-organism. In tuberculosis, for example, the cellular defence is a connective-tissue-cell defence and one in which the polynuclear leucocytes appear to take no part. And when we examine the results of depending upon the opsonic index as a measure of the production of protective bodies by vaccination we find that this has proved altogether unreliable. For in 1904 1/500-1/20 mg. of new tuberculin was regarded as an "extraordinarily small dose." In 1906 Sir Almroth Wright said:

"I now begin with a quantum of tuberculin corresponding to not more than 1/1000 milligram of T. B. powder and never advance to doses larger than 1/600 mg."

In 1910 the doses recommended were 1/20,000 mg. to 1/4000 mg. These doses were from the beginning controlled by observation of the opsonic index, and the earlier cases were reported as doing well with doses which were a very great deal larger than the doses which were afterwards advised to be used.

If we turn now to staphylococcal infections in the defence against which the polynuclear leucocytes do take an important part, and in which the opsonic index might more reasonably have been supposed to be of assistance, we find the same difference between the earlier and the later dosage. In 1903 the opsonic index told us the proper dose was from 2500-5000 million staphylococci and that the index could be controlled and cases cured by these doses; but in 1908 the dose was reduced to 100-250 millions. So that we must begin to doubt the value of this control even in cases of staphylococcal infection, and to ask, "Have we any reliable means of knowing the proper dose of a vaccine?"

Further Criticism.—Viewed again from another aspect, the rationale of vaccine treatment for chronic staphylococcal infection seems to be at fault. In

staphylococcal infections of the skin the protection against a new infection varies with the severity of the primary infection. In the case of a carbuncle the patient is protected against a new infection and the lesion generally remains single. In the case of a boil the protection is frequently of short duration, for it often happens that a second or more boils appear before the first has disappeared; and cases are common in which there are repeated crops of boils over months or years, or a continuous infection of fresh hair follicles, as in *sycosis menti*. In these cases, in spite of the repeated stimulation of fresh infections, although there are intervals of improvement, yet the immunity reactions do not produce a cure; and it is difficult to say why we should expect a vaccine to accomplish that which the repeated reinfections fail to do. In practice we find this to be the case, and, at any rate in my own experience, we but rarely, if ever, succeed in curing a case of chronic staphylococcal infection by vaccines, and we are in danger of ultimately making the case worse by overstimulation.

It has already been said that in practice the treatment of lupus by vaccines is proved to be highly dangerous. In the treatment of staphylococcal infections the danger of doing harm is perhaps less serious, but vaccine treatment of chronic staphylococcal infections of the skin is so uncertain in its results that it seems to have fallen into disuse in dermatological practice almost equally with tuberculin treatment.—H. G. Adamson, in *The Lancet*, Aug. 10, 1918.

Bacteriology of the "Spanish Influenza."*

The pandemic of influenza has not spared any single part of Germany. The clinical course does not seem to differ from that run by the disease in this country. Relapses and fatal pneumonias are particularly noted. The clinical picture is declared to be identical with that of the last pandemic of 1889. A very striking observation has been brought forward and generally confirmed at a special meeting of the Munich Medical Union on July 9th—namely, that persons under 30 years of age mainly fall victims to the disease; this was explained by a survival immunity in the elder generation. The meeting considered all the aspects of the epidemic on the basis of the hospital and University material of Munich. Pfeiffer's bacillus has been found but exceptionally; streptococci, and occasionally pneumococci, were recovered from the sputum, organs, and also blood of the patients. Similar findings were recorded in 1889, and thus the present results were in "keeping with precedent." Pfeiffer's bacillus had not been found until 1892, although it should have been impossible to overlook it in 1889, thus it may be that it will yet turn up in due course. The editors of the *Deutsche medizinische Wochenschrift* have addressed a circular inquiry to all the leading bacteriologists in Germany requesting enlightenment as to the results of their laboratory investigations. Pfeiffer himself had reserved his final opinion as to the relationship of the pandemic with those of 1889 and 1891-92. He had not examined a sufficient number of cases at Breslau, but found his bacillus in some while failing to recover it from others, and was still investigating the causes of this discrepancy. Gruber answered from Munich very simply: "Influenza bacilli not found hitherto—investigations proceeding." Ulrich Friedemann, who is in charge of the infectious ward of the Virchow Hospitals of Berlin, expressed his belief that the symptomatology and complications of the epidemic correspond exactly with those described in 1889-1890. He had not found Pfeiffer's bacillus, streptococci and pneumococci being the most common agents of the complicating

*Der bakteriologische Charakter der "Spanischen Krankheit," *Deutsche med. Wchnschr.*, Berl. u. Leipz., 1918, xliv., 775 and 808. Editorial Notes, München. med. Wchnschr., 1918, lxx., 804.

pneumonias. The influenza bacillus may be evading capture on account of faulty method of inquiry, yet on the other hand the possibility must not be overlooked that there may be epidemic diseases clinically resembling influenza of which Pfeiffer's bacillus is not the agent. Uhlenhuth has so far reported from Strassburg the same contradictory results as those of Pfeiffer. Kolle reported under the date of July 18th from Frankfort his failure to detect Pfeiffer's bacilli in any of the few cases which he had thoroughly examined. In practically all cases there were found, however, large numbers of a Gram-positive coccus—often in a pure culture or in symbiosis with pneumococci. The diplococcus tended to develop involution forms and to grow in very long chains in the condensation water. He regards them as agents of a secondary infection in the "Spanish disease" which to his mind may not be identical with the pandemic influenza of 1889-1893. The finding of this pleomorph Gram-positive diplococcus is very interesting in view of the observations of Rosenow and his pupils in the United States.—The Lancet, Aug. 10, 1918.

Two Victories in Industrial Medicine.

The report of the British Chief Inspector of Factories for the year 1917 contains two papers of great interest, both in respect to the particular problems with which they deal and as encouraging examples of good preventive work. Mr. W. Sidney Smith's article on Doping in Aircraft Works is the story of a wonderful victory for ventilation. A few years ago it would have been thought an impossibility to change the air of an ordinary workplace 30 times an hour without causing discomfort to the workers from draughts, but Mr. Smith and his colleagues have shown how this can be done, not merely without causing draughts, but while maintaining the necessary warmth (about 70° F.) required for the process. He points out the difficulties which he had to overcome from so-called ventilating engineers, who were so wedded to the principles of plenum ventilation that they attempted to introduce pressure fans into dope-rooms. What has been done for the ventilation in aircraft works must mark a great step forward for the more adequate ventilation of workshops as a whole.

The article upon Trinitrotoluene Poisoning, by Dr. T. M. Legge, is an entrancing medical chapter dealing with a serious outbreak of poisoning associated with a high rate of mortality. Under the stress of war work the problem was tackled by a combination of research work and medical supervision in the factories directed from headquarters, combined with strenuous support from engineers in improving the processes and diminishing the contact with the poison. As a result, even though the numbers employed continue to increase, the poisoning has diminished until it has practically reached vanishing point. The introduction of whole-time medical officers in the factories concerned has demonstrated the value of such medical advice on factory premises, and a great extension of this service is in contemplation in the future.—The Lancet, Aug. 10, 1918.

BOOK REVIEWS.

NERVOUS AND MENTAL DISEASE MONOGRAPH SERIES No. 26. THE TECHNIC OF PSYCHOANALYSIS. By Smith Ely Jelliffe, M.D. New York and Washington, D. C.: Nervous and Mental Diseases Publishing Company, 1918, \$2.

It has been said that fifty years must elapse before the medical profession will have sufficiently overcome its resistance to the race propagation instinct to fully appreciate the value and basic truths of psychoanalysis. Surely this splendidly written monograph will, if widely enough read, reduce this period by many years.

The author is a deeply learned physician not of the 'wild psychoanalytic' type, but one who prior to his thorough study of the subject in hand was a well trained neurologist and above all a thoroughly human physician, who not blinded by conventional rearing, to truths in nature, has recognized the enormously important contribution by the psychoanalytic school to the study and cure of the neuroses.

In the first chapter he emphasizes the fact that psychoanalysis is not a 'cureall'; that there are certain cases impossible of analysis and other cases in which analysis would be unwise.

The second chapter is devoted to a brief history of the subject. In the remaining chapters, the author discusses in detail the actual handling of patients, the difficulties which will arise, and how best to overcome them.

The one adverse criticism which one feels forced to make is that whereas the author distinctly announces in the beginning that the work is intended for the beginner, the rather involved style and the failure to use simple English rather than countless words rarely encountered even in psychopathologic literature, makes one feel that in addition to a sincere desire to present a difficult subject in a comprehensive manner, there is a suggestion of a desire to demonstrate a knowledge of unusual English words. The necessity of holding a dictionary in the left hand should not deter either physicians of every specialty or the general practitioner from reading this excellent book, on a subject about which no physician can afford to remain in ignorance.

PRACTICAL MATERIA MEDICA AND PRESCRIPTION WRITING. WITH ILLUSTRATIONS. By Oscar W. Bethea, M.D., Ph.G., F.C.S., Assistant Professor of Materia Medica and Instructor in Prescription Writing, Tulane University of Louisiana. Formerly Professor of Chemistry and Professor of Pharmacology, Mississippi Medical College, etc. Second revised edition. Philadelphia: F. A. Davis Company, 1917, \$4.50.

The scope of this book is somewhat different from that of the usual works on Materia Medica. In it the author has not been content to set down a list of remedial agents with an indication of their therapeutic action and uses, but has in addition specified the preferred methods of administration. Thus under the heading "Belladonna" are given, first the official preparations of the plant and its alkaloid; then the therapeutic action, indications and toxicology; next the methods of administration with prescriptions illustrating the various ways in which the official preparations may be used in treatment.

The latter half of the book takes up the question of prescription writing in its various phases. This includes a chapter of fifty faulty prescriptions showing the pitfalls into which the prescriber may fall. Each prescription

is then corrected and set forth in proper form. In the appendix are arranged various questions and problems for the student of prescription writing.

INTERPRETATION OF DENTAL AND MAXILLARY ROENTGENOGRAMS. By Robert H. Ivy, M.D., D.D.S. 144 pages, with 259 illustrations. St. Louis: C. V. Mosby Company, 1918, \$2.50.

This little volume will do much to aid in the interpretation of dental roentgenograms. In most of the odontograms showing diseased condition about the roots of teeth the author has been able to compare the pictures with the conditions found at operation. In so far the work is of the greatest value. The next step that the physician will demand is a correlation between the findings of the roentgenologist, of the dental surgeon, and of the clinician. How often do these dental conditions result in demonstrable systemic disease? How often does operative eradication of the condition cure the systemic disease for which it is undertaken?

STATE BOARD QUESTIONS AND ANSWERS. By R. Max Goepp, M.D., Professor of Clinical Medicine at the Philadelphia Polyclinic; Assistant Professor of Clinical Medicine, Jefferson Medical College; Assistant Visiting Physician to the Philadelphia General Hospital. Fourth edition, thoroughly revised. Philadelphia: W. B. Saunders Company, 1917, \$4.25.

The fourth edition of this compendium embodies a number of additions. Among these may be mentioned the series of questions bearing on the newer laboratory tests, particularly those which have to do with kidney function and metabolism. The increasing importance of the serologic tests has likewise been reflected in the State Board examinations and these have received their proper consideration in this new edition. The book thus continues to be an excellent volume both for reference and review.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

NOVEMBER, 1918.

No. 11

EDITORIAL.

THE MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

This meeting, which was alluded to in our editorial columns last month, was postponed on account of the influenza epidemic. It will be held in Chicago, December 9 to 12. Many discussions of highly topical subjects are promised and a large attendance is hoped for.

STERILIZING BICARBONATE SOLUTIONS.

There is a large number of pathologic conditions in which intravenous or hypodermic injection of large quantities of sodium bicarbonate is practiced.

A certain difficulty has been experienced in sterilizing these solutions because, at a temperature below the boiling point of water, sodium bicarbonate decomposes, with the formation of more caustic carbonates. It has therefore been the practice to sterilize these solutions by heating them to 65° C. on three successive days.

Not only is this fractional sterilization tedious, but it is, evidently, not available in an emergency. Moreover, it does not always protect from the decomposition, and gangrene has occasionally resulted from hypodermoclysis with such solutions.

It is known that if the bicarbonate solution be heated in an atmosphere of carbon dioxide and cooled in the same condition, the resulting solution contains only the bicarbonate and not the carbonate.

Therefore, if the bicarbonate solution be placed in a bottle with a spring clip stopper, such as is used for sparkling mineral waters, and charged with carbon dioxide, just before closing, it may be sterilized in the autoclave at one sitting. The bottle, before opening, should be cooled and shaken when cool.

It is a wise precaution to add a few drops of phenolphthalein solution before sterilization. Should the finished solution show a pink shade, it must be rejected.

MEMORIZING.

In a recent number of the INTERSTATE a promise was given to furnish our readers with some account of a system which would fulfill three desiderata:

1. Supply a means for uniting unconnected ideas or words in such a way that, without appreciable burden to the memory, the one idea would, practically infallibly, call up the other.
2. Enable one to memorize instantly and certainly any numbers.
3. Provide exercises wherewith the fatigued or distracted mind might be brought to concentrate on the subject in hand.

This is the first installment in fulfillment of that promise.

Man separates, spins, weaves, and dyes fibers of animal and vegetable origin, and clothes himself therewith. He transports himself by the external use of the energy contained in coal, oil, and waterfalls. He harnesses the lightning, and makes it carry his thoughts instantaneously to the ends of the earth. He reduces the expression of his thoughts to written symbols and conventional images, for the use of himself and others.

But he is content to employ his memory as Nature gave it to him. He, usually, makes no advance in this respect on the methods of his paleolithic ancestors. In some respects he deliberately deteriorates his memory; for he takes *notes*, and *learns by rote*, two fatal drugs for the memory.

Yet if, without the apparatus of the charlatan, one presents to the average man a description of a method which can be, to the natural memory, what wheels are to legs, what writing is to speech, he scoffs, because he does not investigate, because he thinks his opinion superior to a trial. Rarely does he reflect that his language is in itself largely figurative, that the symbols with which he makes a permanent record of his thoughts are purely artificial conventions.

In the sentence just written, how different is the original meaning of the word "reflect"—to bend back—from the sense in which we use it! And the letter "C," which the average man uses, without surprise, to represent equally an "s," or a "k," or a compound "ch" sound, was used by the Romans for the number one hundred.

To the narrowminded the new is ridiculous. A memory system, among average people, has the same reception as a fashionable woman, attired in the latest mode of Paris, has in the streets of Podunk.

For this reason, though probably all that the "memory courses"

contain is accessible in the literature, it has been necessary to invest it with mystery and secrecy, to hint at special and peculiar knowledge—to use, in fact, the machinery of the quack—in order to persuade the public to avail itself of the great assistance in life, and particularly in the study and practice of the learned professions, that memory-training can afford.

What follows has nothing of originality. It differs from published systems only in its selection of methods and in their adaptation to the class to which it is addressed.

An Analogy.—If a barge be brought alongside a ship and a line, fast on the barge, be carried aboard the second vessel, then by “stiction and friction,” aided by an occasional pull on the loose rope, the two may be kept in contact, provided there is not too much current, and provided they are not too long neglected.

But if you make fast the line also on the ship, and still more if you replace it by a well-chosen cable or chain, strong yet elastic, you can leave your two vessels, with certainty of finding them in their relative positions, whatever conditions of wind and weather and lapse of time may occur.

The first method is analogous to the natural, the second to systematic “artificial” memorizing.

Analysis of Associations.

Let us consider the chain of associations wherewith an idea is connected with another in such a way that the presentation of the one causes the recollection of the other.

On representation, the conductivity of the different links of this chain is determined by the nature of the associations between the constituent ideas, and by the degree to which they have been analyzed and recognized. It is on the deliberate choice of associative links, and on the analysis of their relation to one another (correlation), that the system which we are about to discuss is based.

To take some concrete instances, probably all of us, except those who have grown up with the sciences in question, have been confused by the (necessary) jargon of the chemists, and still more of the neurologists, with the “Fehling” and “Benedict” and “Barfoed,” the “Salkowski-Kojo” and “Salomen-Saxl,” and a hundred others of the one science, and the daily added-to list of signs—“Rhombberg,” “Kernig,” “Babinski,” which constitute the shorthand of the other. Slowly, gradually, by the “friction and stiction” method of the barge and ship, with an occasional anxious haul on the loose line of revision, some of us can, in favorable circumstances and with uncertainty, keep these signs, their names, their technic, and their significance, not too far away from their proper relative positions. Most of us, especially the old fogies, give up the job as

hopeless. For us, neurology might almost as well be written up in hieroglyphics.

Let us see if we cannot replace that line by a cable or chain, made fast at each end.

Fehling's solution is an alkaline copper tartrate solution. Benedict's is an alkaline copper citrate solution. Barfoed's is an acid copper acetate solution. All are used in testing for carbohydrates. The last is used in distinguishing disaccharides from monosaccharides. The student is assumed to be familiar with the main facts and to require but a slight hint to enable him to recollect the details.

FEHLING sounds like *failing*, which suggests by meaning *falter*, the latter word rhymes with *altar* (a hint of alkaline tartrate)—ALTAR suggests marriage and a *couple*—which word suggests CUPOLA (*alkaline cupric tartrate*).

BENEDICT has *edict* for its last two syllables, which suggests *proclamation*—a form of RECITAL (alk. citrate)—which is a *repetition*—often leads to *excess*—due to *greed*—which is CUPIDITY (alk. cupric. citrate).

BARFOED—gives *bar*—*prison*—arrest—COPPER—*patrol wagon*—salad basket (French slang for patrol wagon)—*salad*—VINEGAR (hints acid-acetate)—*wine*—wine, woman, *song*—*cano* (Lat., I sing)—CANE (hints canesugar=disaccharide)—*reed*—“*shaken by the wind*”—*shake head*—NEGATIVE (Disaccharides do not reduce Barfoed, in standard conditions).

All this at first seems tedious, almost ridiculous, but when the steps do not need explaining, with practice it becomes easy and rapid.

But, so far, we have merely replaced our line by a heavy chain, none too securely fastened, and we have not examined sufficiently the links.

When we examine the nature of the relation between two ideas and which causes the presentation of one to call up the other, we find that it falls in one or more of a limited number of classes.

Thus in the series we have worked out, the idea *failing*, suggests the idea *falter*, because they are similar in meaning (Correlation by *meaning*, M) and also because *failing* causes to *falter* (Correlation of *Cause and Effect*, C and E). *Proclamation* has part of the meaning of *recital*, but it is also a kind of *recital* (Correlation of *Genus and Species*, G and S). *Edict* is a part of the word *Benedict*, as *bar* is of *Barfoed*: *vinegar* is a part of *salad* (correlations of *Whole and Part*, W and P). *Falter* resembles *altar*, and *cupola*, *couple*, in sound (Correlation by *Sound* S).

To most persons no other idea is more sharply called up by the presentation of the idea white than the idea black. This is correlation by *Difference* (D.), and is one of the strongest links in an associative series. Consider for a moment the relation between

the ideas "picture" and "frame." You will find that they are extremes of the short series: *picture* (W & P) picture and frame, (W & P) frame. But we have thought of them so often together that the intermediate step is forgotten. Such a correlation is said to be by *Concurrence* (C.). Re-examining our series and naming such of the correlations as we can (putting initials) we get:

Fehling (S) failing, (M) (C and E) falter, (S) *altar*, (C.) (C and E) marriage, (W and P) couple, (S) *cupola*.

Benedict (W and P) edict, (G and S) proclamation, (G and S) *recital*, (G and S) repetition, (C and E) excess, (C and E) greed, (M) *cupidity*.

Barfoed, (W and P) bar, (W and P) prison, (C and E) arrest, (C and E) *copper*, (W and P) patrol-wagon, (M) panier de salade, (W and P) *vinegar*, (G and S) *wine*, (W and P), wine, woman, song, (W and P) song, (C and E) sing, (M) cano, (S) *cane* (G and S) reed, (G and S) "reed shaken by the wind," (W and P) shaken, (G and S) shake head, (M) *negative*.

Run through this analysis once forward and once backward, naming each correlation, without looking at the printed page, and see if you know how to forget what Fehling's, Benedict's, and Barfoed's solutions are, and that the last is not reduced by disaccharides in standard conditions.

This elementary process must be thoroughly mastered before one is fitted to proceed to the more complex, interesting, and useful exercises which follow. For this purpose the student should make his own series, preferable of useless and nonsignificant extremes, because otherwise he may, by aid of the natural memory, skip some of the intermediates and defeat the object of the exercise.

(To be continued.)

EDITORIAL COMMENT.

Why is War? Can it be abolished by the simple expedient of international agreement? If not, How?

These are the questions that will occupy our minds for some time to come, though truth to say the simpler minds among us do not seem to entertain any doubt on the two first questions. War, they hold, is the consequence of non-democratic governments. It can be abolished by the setting up formal democracy throughout the world, and then making a Solemn League and Covenant to close the temple of Janus "for keeps."

There are, however, those who take a less optimistic view. Some of these hold that democracy is of the inner soul of a nation, and not of its outer forms. They point to nations that are democratic in

form, but oligarchic or plutocratic in essence. And so long as material success is the standard of judgment, this must be. If we adopt literally, as is done in some places in this wicked world, that cynical French proverb, "*L'argent ne pue pas*," so long shall we be under a mere mockery of democracy. If the fact that a man probably got his money by graft does not affect his social or political standing, provided he can "get away with it," then it is idle to set ourselves above other nations as an example to them, whether we are democratic, monarchical, or anarchistic in our own outer forms of government.

Then consider the question biologically. Why is War? If we can find its true cause, we may discover a remedy, or, and this is the crux, a *substitute*.

War is a manifestation of vanity. "The vanity of kings," say the formal democrats. The vanity of the animal *Homo Sapiens*, replies the biologist. What is vanity?

Vanity is the desire to excel in pleasing the opposite sex. It is, therefore, in its original manifestations, of which the combat instinct is one, a high and can become an exalted virtue. Just as exalted as the closely related maternal instincts.

The women of the nations are now facing the unpleasant necessity of abdicating as the wives of handsome heroes in khaki, to take the humbler rôle of commuters' wives. They do not like it. The men do. That is the difference. Do men quarrel combatively in their clubs? They do not. Do they when women are involved? Don't they?

Women suffer most in war. They also glory most in it. War is their tribute. If they do not know it, they act as though they did, and that is what matters.

If at your club a man dines with you who has the V. C., do you let your men friends know this before you introduce him? You may or you may not. But omit that little preliminary when you are about to present him to a woman, and you will do well to avoid her when she finds out about him, after having, owing to your negligence (of biological principles), treated him indifferently. *Experto credite*.

COLLECTIVE ABSTRACTS

RECENT FRENCH VIEWS ON ANTISEPTIC DRESSINGS.

BY THE EDITOR.

One method of treating infected wounds, the Carrel-Dakin, has found so many and such enthusiastic volunteer press agents, lay and professional, that we, on this side of the Atlantic, are apt to think that it is in general, if not universal, use.

No doubt this is partly due to the international or interallied origin of this technic, the result of the collaboration of a French surgeon with an English chemist, both of whom have done much work in the United States.

Yet, when we read our European exchanges, we find little about Carrel-Dakin and much about other methods using, some the hypochlorites, some other agents. And from those who have *extensive* first-hand knowledge we learn that the Carrel-Dakin technic is limited in its use to a comparatively narrow circle of hospitals. The disadvantages of the method which militate against its extension are stated to be, first, the delicacy and comparative difficulty of the technic; second, the sodden condition in which it leaves the surrounding tissues; third, its unsuitability in positions where there is much fat; fourth, its doubtful efficacy in gas gangrene.

Ether Dressings.

In reading the accounts of visits to the French military hospitals one is particularly struck by the reiteration of the praise of the ether dressing. One welcomes, therefore, an article on this subject from the pens of Drs. Pierre Descomps and André Richard. No abstract can do justice to this paper, nor any translation convey a true rendering of its exquisite lucidity. Nevertheless, the INTERSTATE would have published a full translation but for the circumstance that in the preceding number of *Paris Médical* there had been published an article by Lorin on the choice of an antiseptic dressing, and that it is more convenient to consider these two papers together.

General Considerations.—At the commencement of the war, Ombredanne used ether in the treatment of infected wounds, of gangrene, and of gas-bacillus phlegmon.

As early as 1914 one of our present authors more or less standardized his practice on these lines—free excision of traumatized tissue with simple aseptic dry dressings, soaked with ether in septic cases.

The results were particularly favorable in the cases, at that period so common, which had developed localized gangrene owing to long journeys without proper previous laying open of the wounds. He strongly recommends ether dressings as the treatment of election for infected wounds, and very specially so when long journeys have to be undertaken.

More recently ether has become almost essential in the practice of accelerated healing by suture of the wound. Since 1916 it has been used in joint surgery. Pierre Duval introduced it for washing out the pleura in pleuropulmonary interventions. At the present time ether dressings are used in the war

practice of most [French] surgeons and it is fair to say that they are one of the bases on which has been built up the surgery of primary suture.

The chief properties to which ether owes this popularity may be considered under the heads of detergent, antiseptic, cytophylactic, and solvent actions. As a detergent ether acts, as does hydrogen peroxide, because of the disengagement of vapors in contact with the wound. In the case of ether these vapors are those of the substance itself, liberated owing to its low boiling point (35° C.), which is below the normal blood temperature. Moreover, it is a remarkable solvent of fats and of many of the toxic substances present in infected wounds.

As an antiseptic, when tested by the method of pyoculture, ether takes first rank. Delbet's results are as follows: The sterilization of an infected region was realized: with formol, in no case out of four; with Dakin's fluid, once out of 23 cases; with bichloride or oxycyanide of mercury (1 to 1,000), once out of 10; with 5-percent carbolic, 5 times out of 14; with ether, in 50 percent of the cases.

According to Descomps and Richard there can be no disputing the favorable action of ether in promoting the sterilization of wounds. A large part of this they attribute to its seconding the work of autosterilization, in which respect it appears to have a more powerful action than any of its rivals.

"The ether dressing is less an antiseptic dressing than one which prolongs and completes the simple dry dressing of the aseptic method."

As a Dressing for Boils, etc.—In the treatment of lymphangitis, adenitis, carbuncles, inflammation of the parotid or of the mammary gland, and the like, the application of ether dressings often causes the disappearance of inflammation in slight cases. In others the extension of the inflammation is checked, and suppuration promoted. True pus being formed, it can be evacuated by a small opening, with esthetic gain. The following method is recommended: The whole inflamed area and part of the surrounding surface is covered with two or three gauze compresses, soaked to saturation with ether. Over this is placed impermeable tissue, and, lastly, a thick pad of cotton. The dressing is held in place by a bandage, moderately tight in the center, closely adjusted at the edges to check evaporation. Three times a day the dressing is resoaked with ether through a tube slipped through the bandages or left *en permanence*.

Ether Dressings for Wounds.—This is the principal field of application of these dressings and especially their use in the treatment of war wounds.

Whatever method is used, the preliminary cleaning of a war wound by the use of a standardized and scrupulously executed practice is a condition precedent of success. Ether dressings are not exempt from this necessity.

The evolution of the practice of wound dressing during the war has, to a great extent, run parallel with the development of the principles of the general treatment of war wounds. And, even today, this practice is subject to variations determined by differences such as those of terrain, activity, and climate, to which Tarnowsky attributes the differences between the British and the French practice in these respects.

The present-day ideal is accelerated healing by primary suture whenever this is practicable.

Secondary suture is limited to the few counterindications or the rare failures of primary suture, or to those cases where this latter practice is momentarily physically impossible.

Tertiary cicatrization by granulation is exceptional.

If circumstances oblige the surgeon to limit his first intervention to the laying open and cleaning of the wound, before handing over the patient to a rearward formation, there still present themselves a series of stages at which the wound may be closed by suture—late primary, early secondary, late

secondary suture. In fact, every wound ought to have united in general by the twentieth, at the latest by the fortieth, day.

In the opinion of our authors, ether cannot be replaced by any other agent in the practice of primary suture, early or late. It has no counterindications.

In secondary suture ether is again the best, though in certain cases its action may advantageously be supplemented by that of other agents. Of these cases three groups are mentioned. When infection persists obstinately in a wound, with exudates covering the granulations, the hypochlorites, acting as "a chemical bistoury," are useful in cleaning off the exudates and "brisking up" the wound. They should be applied only temporarily, and copious irrigation should be avoided. In wide, superficial, atonic old wounds, but slightly infected, irrigation with a solution of magnesium chloride is indicated. Heliotherapy is called to play a part, complementary to surgical intervention, in promoting the healing of old deep bone lesions.

Technic of Ether Dressings.—In its general lines the technic of ether dressings of war wounds follows that already described for the treatment of local infections. The following are supplementary details: At the highest point for a given position of the patient the compresses are pierced by an india-rubber drain, of medium bore, held in place by a compress. When in a deep irregular wound it is desired to maintain the opening of certain cavities, it is well to pack each end with tight rolls of gauze, while in the center are placed small perforated tubes loosely wrapped in gauze. The dressing is completed as before mentioned, the impermeable tissue being perforated for the passage of the tube or tubes. The ether is renewed by means of these tubes. We have here one of the signal advantages of the method. The complete changes of dressings are rare, the renewal of the ether easy and devoid of inconvenience to the patient. Owing to the high diffusibility of the liquid, it penetrates well and does not lie stagnant in pools. Moreover, it announces its arrival at the desired destination by producing a sensation of cold.

With regard to the future, Descomps and Richard sum up as follows: "So far as it is possible to predict how much of our war methods will remain in civil practice, we hold that dry asepsis will be, as before, the basis of our technic, but that ether dressings, with appropriate indications, will be used to complement this. In particular, in rural practice, in which a method permitting of infrequent dressings is a necessity, ether dressings, which can be intrusted to an untrained hand, will be given the preference over all other methods.

Vincent's Dressing.

Lorin's article bears the title, "The Choice of an Antiseptic Method in War Surgery and the Indications for Professor Vincent's Dressing," but it deals, in effect, only with the latter subject. It differs utterly in style from the article which we have just considered, and is, for a French production, surprisingly platitudinous.

It will be remembered that Vincent's dressing is a powder composed of an intimate mixture of hypochlorite and boric acid.

Lorin lays down five considerations for a topical application for a war wound:

1. It should be simple in use.
2. The antiseptic virtue of the dressing should be automatically maintained.
3. The dressing should be nontoxic and painless.
4. It should not be caustic.
5. The applications should be particularly efficacious against anaerobes.

In Lorin's opinion Vincent's dressing satisfies these requirements. He quotes Bazin in support of his view that this borohypochlorite powder is efficacious against anaerobes in subtoxic doses.

A further claim is made that it is a powerful oxidizer of toxins. This will hardly be disputed in view of the known properties of its principal constituent. Lorin attributes to this dressing some of the virtues of Wright's hypertonic saline.

Our author does not explain how a powder or its products is to be made to penetrate the recesses of an irregular wound, to effect which with a solution (such as Dakin's) elaborate technic is necessary.

In sum the article is prolix and unconvincing.

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¹ Descomps P. and Richard A.: *Le Pansement à l'Ether* (Paris médical, Sept. 21, 1918).

² Lorin, H.: *Le Choix d'une Méthode Antiseptique* (Paris médical, Sept. 14, 1918).

³ Bazin: *Recherches expérimentales sur le pouvoir antiseptique de la poudre boro-hypochloritée de Vincent* (Soc. de Biol., Feb. 9, 1918).

FUNCTIONAL METHODS FOR STUDYING DISEASED CONDITIONS OF CERTAIN INTERNAL SECRETORY ORGANS (THE ENDOCRINOPATHIES).

By JACOB ROSENBLOOM, M.D., Ph.D., Pittsburgh, Pa.

(b). Iodine Tests for Hyperthyroidism.

It has been a well-known fact that the administration of iodides over long periods to cases of goitre may produce symptoms of hyperthyroidism.²⁶ Fr. v. Mueller suggested the use of iodine as a means of disclosing hyperthyroidism, as those suffering from the same often show an intolerance to iodine by showing emaciation and tachycardia after its administration.

However, the administration of thyroid gland, iodine, or iodide of potassium to show a latent hyperthyroidism is too dangerous a procedure to be used as a routine clinical test. This is especially true when signs of emaciation are present.²⁷

(c). Application of Specific Ferment Test of Abderhalden to Diagnosis of Hyperthyroidism.

Lampe²⁸ and coworkers have studied the possibilities of applying the Abderhalden specific ferment test to the diagnosis of thyroid states. They believe that the blood serum of patients with hyperthyroidism contains ferments which are specific for thyroid tissue. They think that if in cases of hyperthyroidism there is an over-production of normal thyroid secretion, a negative result with the Abderhalden test should be obtained, because in this case there is an introduction into the blood of a purely native protein, only in increased amounts, and therefore no production of ferments. If, on the other hand, we have in cases of hyperthyroidism the presence in the blood of a protein that is secreted by the thyroid, but of an altered composition on account of the pathological changes in the gland, then this foreign protein would stimulate the production of a specific ferment and the Abderhalden reaction would be positive.

They studied the effect of the serum from cases of hyperthyroidism upon normal thyroid gland, exophthalmic goitre gland, cystic and parenchymatous gland, normal thymus, hyperthyroidism thymus, ovary, testicle, kidney suprarenal, pancreas, etc. In all cases where the serum from cases of hyperthyroidism was allowed to act upon hyperthyroidism tissue, the tissue was digested. In a few cases the reaction was positive when the normal thyroid tissue was used. The reaction was also positive in four out of five of the cystic goitre cases and in the thymus and ovarian tissue cases. With the other tissues the reaction was negative.

On account of these results they believe that in cases of hyperthyroidism, so-called, there is a true dysthyroidism, not a simple hyperthyroidism.

Abderhalden's Sero-Diagnosis.

Two distinct methods of detecting the presence of these antibodies have been devised. The first, the optic method, is capable of very wide application to the diagnosis of different conditions, and should prove extremely useful in

solving many problems of great clinical importance. It requires, however, considerable skill and technical ability, as well as rather expensive apparatus. The second, the dialyzation method, is much simpler both in technic and in necessary equipment. Both of these methods require the most assiduous attention to the various details given, if any dependence is to be placed upon the results of the tests.

1. *The Optic Method.*—The basis of this test is as follows: A solution of thyroid peptone in physiologic salt solution has a definite power of rotating the plane of polarized light. Likewise, the serum, both suspected and normal, has a similar action. The degree of rotation, however, of either remains permanent for some time at 37° C. If a solution of peptone and normal serum be mixed and the degree of rotation of this mixture determined, no appreciable change will be observed between the initial and final polarimetric readings. If, however, a solution of thyroid peptone, whose polarizing is known, be treated with a serum containing the specific ferments above mentioned, digestion of the peptone occurs with the formation of products showing rotatory powers sufficient to change the initial rotation of the mixture to quite an extent. These changes may be observed at different intervals and interpreted as described later.

Preparation of Thyroid Peptone.—The thyroid is made blood-free by cutting it into small pieces and placing these under running water for about fifteen minutes. Dry the pieces between folds of filter paper and place them in about five times their weight of 70 percent sulphuric acid. Allow the mixture to stand for three days at room temperature and shake the container frequently. At the end of this time, place the container in ice-water and dilute the contents with ten volumes of distilled water, stirring constantly. Remove the sulphuric acid by adding approximately the calculated amount of finely powdered barium hydrate and complete the precipitation with a known solution of this salt, stirring the mixture constantly. When the reaction of the mixture becomes neutral to litmus paper, filter off the barium sulphate. If the filtrate be turbid, refiltration is necessary until a perfectly clear filtrate is obtained. The separation of the barium sulphate is much facilitated by the use of the large centrifuge, if such be at hand. Wash the precipitate with a large amount of cold water and combine the filtrate and washings. Test the mixture for both barium and sulphuric acid. If either be present, it must be removed. Now evaporate this barium—and sulphuric acid—free solution to dryness on the water-bath, under reduced pressure at a temperature not exceeding 40° or 50° C. It is wise to test the evaporated material at several intervals for the presence of either barium or sulphuric acid, as these sometimes appear on concentrating the mixture. It is important that these be removed, as their presence will result in further hydrolysis of the peptone and, in consequence, will lessen the value of the final product. A thick yellow syrup or a foamy mass remains after this evaporation. The product may be used in this form, but it is preferable to purify it, if reliable results are to be invariable.

This yellowish residue is dissolved in methyl alcohol with the aid of heat and the hot solution is poured into absolute ethyl alcohol. The peptone is thrown down as a yellow powder, which is soluble in water to a clear yellowish solution of weakly acid or amphoteric reaction. This powder is not hygroscopic. A further purification is still advisable. Dissolve the above yellow powder in water up to a 5 percent solution and add 10 percent solution of phosphotungstic acid as long as a precipitate forms. Filter and wash several times with water. Rub up this precipitate in a mortar with some water and twice its weight of barium hydrate. Filter again and remove the excess of barium from the filtrate with sulphuric acid. Filter off the barium sulphate

and evaporate the filtrate to dryness under reduced pressure at 40° to 50°, as outlined above. This product is snow white and is permanent.

It is absolutely essential for the successful application of the optic test that this peptone be as pure as possible. The same product is not always obtained by the above method, as the hydrolysis may proceed further than the peptone stage. Such products are unsuitable for the test. It is wise, therefore, to work as quickly and as carefully as possible with a large amount of thyroid substance, so that one may obtain an appreciable amount of peptone. If the product be found serviceable, it may be kept for years. A further point to be considered in the use of a prepared peptone is that the solution of this product must give absolutely no turbidity with the serum to be tested. Such a finding is not infrequent, owing to the probable presence of precipitins in the product. Such a peptone cannot be used.

A further important property of the prepared peptone must be its power of rotating the plane of polarized light. The degree must not be too small, or the product will prove of little value. It will be seen, therefore, that the preparation of a serviceable and proper peptone is a matter of considerable difficulty and is essential to the successful performance of the test.

One may preserve the peptone, prepared as above, either in the solid state or in the form of a solution. The advantage of a solution is that one has on hand a large amount of material, which will give good comparative results, as the solution is permanent. Abderhalden formerly used solutions of 0.5 to 2.5 percent strength. This solution must be absolutely clear and colorless. If not, filter thick paper or a Berkefeld. Preserve this clear solution by overlaying its surface with toluol. When required for the test, the solution is withdrawn by a pipet dipping below the toluol. If care be taken to keep a layer of toluol over the solution, the stock material will be permanent for a long period. Should this solution become turbid at any time, the material should be thrown away and a new stock solution prepared as above. The optical activity of this stock solution must be tested before each test.

Obtaining the Serum.—The serum of the patient is obtained as in the complement-fixation tests, withdrawing 10 to 15 c.c. of blood. Place the blood, as drawn, directly into a sterilized centrifuge tube, so that all cellular elements may be completely separated. For a successful test the serum must show no sign of the presence of cells. A further precaution to be taken is that no sign of hemolysis must be present in the serum. For this reason the cells should be separated rapidly. It is wise to make the test on the same day on which the blood is taken, although, if the precautions above mentioned are observed, a delay of twenty-four to forty-eight hours does not materially affect the activity of the serum.

Technic.—Having prepared the 10 percent solution of peptone and having proved that it answers all the requirements mentioned above, place 1 c.c. of this clear solution (withdrawn by a pipet) in a small, clean, sterile test-tube. Add 2 c.c. of the clear suspected serum and shake the tube several times. Examine the mixture carefully for any turbidity or precipitation. If any be observed, the test cannot be carried out. Add sufficient physiologic salt solution to the mixture to fill the 1 decimeter polarimetric tube (see below). This mixture with salt solution is preferably made in this way, rather than to add the salt solution after the peptone solution and serum have been placed in the polarizing tube. Any turbidity may be much more easily detected. Pour the above mixture into the 1 decimeter tube, whose mantle has been filled with water at 37° C.

Carefully determine the initial rotatory power of the mixture, checking the readings several times and controlling them by subsequent ones after five or ten minutes. No change should be observed in these readings. Place the

tube and its contents in the incubator at 37° C. and repeat the readings every hour for a few periods and then continue every six to eight hours. Do not extend the investigation over more than forty-eight hours. Record all readings and interpret them as given below.

Control tubes must be arranged as follows: (1) The peptone solution alone; (2) the suspected serum alone; (3) peptone solution plus normal serum; (4) peptone solution plus known positive serum; (5) peptone solution plus inactivated (heated to 60° C.) suspected serum. In all of these controls the same conditions must be maintained and the same length of polarizing tube must be used as in the test itself. If any turbidity occurs in any of the control mixtures or tubes, these must be disregarded in interpreting the test, as turbid solutions give variable results with the polarimeter.

It goes without saying that this test requires the very best equipment possible. The cheap polariscopes are absolutely useless, as they are not delicate enough to detect the fine variations given. The three-shadow instrument of Landolt-Lippich, made by Schmidt and Haensch, is especially to be recommended. The polarizing tubes used are, preferably, the decimeter tubes, which are furnished with a mantle that may be filled with water at any desired temperature. If different length tubes are used in any of the tests, a correction must be made in order that comparative figures may be obtained.

In performing this test, even to a greater degree than when the instrument is used in other work, much depends upon the ability of the worker to detect slight variations in the degree of the rotatory powers of the mixtures under investigation. The method is easy to learn, but the special sensibility toward such changes cannot be taught. Abderhalden cautions anyone who shows a working error of as much as 0.04° in his observations against attempting to interpret the test.

In reporting the result of this test Abderhalden employs the following method:

Deviations within 0.04°	Negative.
Deviations between 0.05 and 0.1°	Positive (+).
Deviations between 0.11 and 0.2°	Positive (++).
Deviations over 0.2°	Positive (+++).

2. The Dialyzation Method.—This method is much more simple than the optic method, both as regards technic and apparatus. It must not be thought, however, that any less care is necessary in carrying out the details of the test. In fact, erroneous results are, perhaps, more easily obtained by careless manipulation when this method is employed.

The basis of this method is the conversion of the colloidal non-dialyzable protein into dialyzable products through the activity of the ferments above mentioned. These products are, then, detected by simple color reactions in the dialysate.

Preparation of Thyroid Protein.—Remove the external portions of the thyroid and wipe away as much blood as possible. Cut the material into small pieces and wash for a short time in running water. While this is being done, boil about 2 litres of water to which are added two drops of glacial acetic acid. Throw the washed bits of thyroid into this boiling water and boil for five to fifteen minutes. Pour the mixture upon a loose quick-acting filter and boil the pieces again with a second portion of acidulated water for five to fifteen minutes. Pour off this water and test with the triketohydrinden hydrate reaction given below. If a positive reaction obtains, the thyroid tissue must be again boiled with acidulated water until a negative reaction occurs. The essential points in this process are rapid and complete coagulation of the albumin and the

removal of all soluble dialyzable material which may react with the reagent mentioned above.

It is essential that all visible blood be removed, as its presence will introduce a large error.

Care must be taken not to add an excess of acetic acid to the water, as this may interfere with the ninhydrin test and thus give rise to an appreciable error.

As soon as a negative result is obtained with the extractive water, pour the water into a wide-mouth flask, add some chloroform, overlay the fluid with toluol, and stopper the flask; or place the material in several smaller glass jars and overlay with toluol. This albumin keeps almost indefinitely, and may be removed from the containers as desired. It should be tested, from time to time, to show that it contains, in itself, nothing which may react with the reagents used in the later test. Abderhalden recommends that this albumin be tested with ninhydrin before being used in any test. This is a vital point.

Obtaining the Serum.—The serum is obtained by venous puncture, the blood (about 10 c.c.) being drawn directly into a sterilized centrifuge tube. The cellular elements are separated as quickly as possible and the serum drawn off into a clean sterile tube. It is of especial importance in this test that the serum show no sign of hemolysis. As it has been shown that amino-acids are present in the blood during digestion and may, therefore, give a positive reaction with triketohydrinden hydrate, it is wise to take the blood in the morning before breakfast in all cases. If such be not done, a less amount of serum must be used in the later test to compensate for this possible error.

Selecting the Dialyzing Tube.—It is evident that this part of the preparation for the test is of extreme importance. The dialyzing thimbles must be permeable for peptone, but not for albumin. Unless these conditions obtain, the test is valueless. Not all of the thimbles purchasable on the market are by any means available. Abderhalden advises the use of the diffusion shells No. 579A of Schleicher and Schull. Not all of these will answer the purpose.

It is necessary, therefore, that all the dialyzing thimbles used in the test should have been previously tested and known to answer the above requirements. As the thimbles are usually dry and hard when obtained, soak them in cold water for a few hours, place them in boiling water for a few seconds, and keep them in water covered with toluol.

To test these thimbles for their permeability for albumin, proceed as follows: Remove the thimble from the water and place in it 5 c.c. of serum or of a solution of egg albumin. Add a few drops of toluol to prevent bacterial action. Place 20 c.c. of distilled water in the dialyzing vessel and overlay this with toluol. This dialyzing vessel should be quite narrow, the distance between the wall and the thimble (when in place) being about $\frac{1}{4}$ cm. These vessels are kept plugged with cotton and are sterilized before use. Now suspend the thimble with its albuminous contents in the dialyzing tube in such a way that the fluid outside is as high as, or preferably a little higher than, that within the thimble. Plug the vessel with cotton to prevent contamination and put the apparatus in the incubator at 37° C. for eighteen to twenty-four hours. At the end of this time, test the dialysate (outside fluid) for albumin by the biuret or triketohydrate reactions given below. Those thimbles giving negative results are retained, to be tested for their permeability to peptone. The shells permitting the passage of albumin cannot be used in the test.

Select those thimbles showing impermeability to albumin and wash them thoroughly in water. Place in them 5 c.c. of a 1 to 1000 solution of Witte's or, preferably, peptone from silk (peptone La Roche) and add sufficient toluol to cover the solution. Dialyze as above against 20 c.c. of distilled water, placing the apparatus in the incubator for eighteen hours at 37° C. Those thimbles

which permit the passage of peptone, as shown by the triketohydrinden hydrate test, are kept for use in these tests and the non-permeable ones are laid aside. The properly tested and selected thimbles are then preserved in water overlaid with toluol.

Technic.—Remove a few pieces of the coagulated albumin from the container, wash in distilled water, and dry between filter paper. Test the material before use with the triketohydrinden hydrate reaction. Absolutely no trace of a blue coloration should obtain. Break this up into very small bits or grind up in a mortar. Weigh out three portions of $\frac{1}{2}$ gram each. Place $\frac{1}{2}$ gram in each of three tested dialyzing thimbles in such a way that none of the material touches or remains upon the top or outside of the shells. Carefully wash off the outside of the thimble by means of a stream of distilled water or hold it under running water. This is done to remove any possible adhering albumin, which would vitiate the test later made. Now add to tube No. 1, 1 to 1.5 c.c. of clear hemoglobin-free serum to be tested. This serum is withdrawn from its container by means of a sterile graduated pipet. Overlay the surface of the mixture in the thimble with toluol. This thimble is then placed in a sterile dialyzing tube, as described above, containing 20 c.c. of distilled water, which should stand toluol, and plug the dialyzing vessel with cotton to prevent contamination. Place slightly higher than the fluid in the thimble. Overlay the external fluid with the apparatus in the incubator at 37° C. for eighteen hours and then test the dialysate for peptone as outlined below.

Controls.—Charge thimble 2 with $\frac{1}{2}$ gram of thyroid albumin and 1 c.c. of serum of a known positive control. Overlay with toluol and arrange as above.

Charge thimble 3 with $\frac{1}{2}$ gram of thyroid albumin and 1 c.c. of a known negative serum or with the inactivated (heated to 60° C.) serum used in the test.

A further control should be run, using 1 c.c. of the serum alone without the addition of albumin, to prove that it does not contain any dialyzable substances which will give the later reactions.

The tests with all of these controls are carried out exactly as the test itself, every precaution being taken to prevent the introduction of errors. The tests for cleavage products of albumin are made with one of the following tests, the latter being in some respects preferable:

The Biuret Test.—This was the test formerly employed by Abderhalden, and has some advantages in that it does not react with certain dialyzable products not infrequently present in the serum of normal subjects. It requires considerable care and skill in manipulation as well as in interpretation. Doubtful results are very frequent unless every precaution be taken.

Remove about 10 c.c. of the dialysate by means of a pipet dipping below the toluol. Place this in a test-tube and add 5 c.c. of a 33 percent sodium hydrate solution. Mix by careful shaking and add very carefully, drop by drop, from a buret a very dilute (0.25 percent) solution of copper sulphate in such a way that a distinct contact ring is formed. If peptone is present, a violet-red to a pure red contact ring will be observed, sharply differentiated from the lower colorless and upper blue solutions. This is of a distinctly blue ring. It is not the simplest matter to distinguish between the various shadings which occur, so that one must not make his decision without having had some experience in differentiating the colorations obtained with pure albumin and peptone solutions.

The Triketohydrinden Hydrate Reaction.—This reagent occurs in colorless crystals readily soluble in water. It may be obtained under the trade name of "ninhydrin." Its formula is $\text{C}_6\text{H}_4 \begin{smallmatrix} \text{CO} \\ \diagup \quad \diagdown \\ \text{C}(\text{OH})_2 \end{smallmatrix}$.

It is of especial importance that every precaution be taken to prevent error when this reagent is used, as reactions may rise from the presence of substances

which are not at all associated with the hydrolytic products of protein material. This reagent is not by any means specific, even for albumin, peptone, or amino-acids, although it was formerly believed that it reacted only with substances containing an amino and a carboxyl group, the former especially in the α position. It has been shown that there is a large number of compounds which are not in a chemical sense combinations with amino and carboxyl groups and which nevertheless give very characteristic reactions. Among these we find: amines; amino-aldehydes; urea derivatives; amino-sulphonic acids; ammonium derivatives of certain organic acids, dicarbonyl compounds, and halogen-aldehydes; ammonium compounds of thiosulphuric, oxy-sulpharsenic and selenic acids; ammonium formate, ammonium thio-lactate, etc. Of special importance is the fact that a very small amount of basic products of putrefactive origin will give a decided reaction (hence the importance of using every means to prevent decomposition of the tissue).

Certain further precautions are essential. If any of the original albumin be left on the outside of the dialyzing thimble, a very obvious error will arise. If the serum used contains amino-acids, the amount must be determined by depth of color with the ninhydrin. One must avoid the presence of acid or ammoniacal fumes in the laboratory. Strong alkalies cause, in themselves, a coloration with the reagent, while dilute alkalies may decolorize the solution. Acids prevent the appearance of the blue color and will destroy the color already formed, even in the presence of a large amount of reacting material. It must be insisted, therefore, that the fluid to be tested be absolutely neutral. Further, all vessels and pipets must be absolutely clean and the water used must be free from bacteria.

Remove 10 c.c. of the dialysate by means of a pipet dipping below the toluol and place this in a large test-tube. Add 0.2 c.c. of a 1 percent aqueous solution of triketohydrinden hydrate. Heat rapidly to the boiling point and keep the mixture boiling for one minute. If the reaction be negative, the solution remains colorless or becomes, at most, light yellow. If the reaction be positive, a deep blue color will appear either immediately or on allowing the tube to stand for a short time. After use wash the thimbles thoroughly in running water and then place them in boiling water for not over fifteen seconds.

The reaction is carried out in the same way with the control tubes. Tube 2 should show a distinct positive reaction, while tube 3 should give a negative result. The tube with serum alone should show a negative reaction, but occasionally it is positive owing to the presence of a large amount of amino-acids in the serum as drawn. If the controls are all positive, the test is, of course, valueless, as some factor has been imperfectly controlled.

(d). The Aceto-Nitril Test of Reid Hunt for Hyperthyroidism.

Reid Hunt²⁹ found that mice when fed upon thyroid gland developed an increased resistance to aceto-nitril or methyl cyanide CH. CN. This substance is toxic, chiefly on account of slowly liberating hydrocyanic acid in the body. He found that this reaction was specific for thyroid and more delicate than any chemical test, and on this basis suggested this increased resistance to aceto-nitril as a delicate test for thyroid substance and to determine whether there is an increased amount of thyroid secretion in the blood in cases of hyperthyroidism.

He applied the test to three cases of hyperthyroidism. The blood in one of these cases had a marked effect in increasing the resistance of mice to aceto-nitril, indicating an excess of thyroid secretion. The second case was doubtful and the third negative.

The test is carried out by giving mice 1 or 2 c.c. of blood made up with meal

in the form of cakes for nine or ten days before testing with aceto-nitril, using controls. One-fourth of a milligram of aceto-nitril per gram of body weight of mouse may be fatal to a normal animal in a few hours.

Hunt's findings have been corroborated by Trendelenburg³⁰ and Ghendeni.³¹ Trendelenburg and also Lussky³² claim that the blood of cats gives the test even after removal of the thyroids.

This method has not been sufficiently tested as yet to be used clinically. A complicating factor is the variations in the natural resistance of animals and the possible variations in the amount of thyroid in the blood under normal conditions.

(e). Test of Claude, Boudouin, and Porak for Hyperthyroidism.

The above observers³³ have described the use of the extract of the posterior lobe of the pituitary in the diagnosis of latent hyperthyroidism. This extract was obtained by the action of alcohol at 70° upon the pituitary powder, which was dried and freed from fat. The alcohol is evaporated and the residue dissolved in normal salt solution. The strength of the solutions used was such that 1 c.c. was equal to one-half of a posterior lobe of a beef's pituitary, corresponding to 0.5 gram of pituitary powder.

They found the subcutaneous injection in normal cases produced a marked reaction, pallor, glycosuria, diarrhea, and acceleration of the heart. The blood pressure remained the same or was lowered. When injected into cases of hyperthyroidism, the results were the same, with the exception of the cardiovascular effects. In normal cases the acceleration of the pulse commences two to three minutes after the injection and reaches a maximum in ten to fifteen minutes. Then the increased frequency diminishes and in about twenty minutes the pulse rate is normal. In the cases of hyperthyroidism the pulse, which is rapid before the injection of the pituitary extract, becomes very quickly slowed from eight to ten beats. This lowering is reached in about two minutes, sometimes four to six, or rarely ten. This slowing lasts from seven to eight minutes, and as a rule returns to a rate markedly below the rate previous to the injection.

This bradycardia effect they think is due to stimulation of the vagus nerve, while its effect in the cases without existing hyperthyroidism is on the accelerator sympathetic. In the cases of hyperthyroidism there exists a tachycardia due to hyperexcitation of the sympathetics, and on account of this state of hyperexcitation these nerves do not react to the pituitary extract. The nerve endings of the vagus which are not excited feel the full effect of the pituitary stimulation and the heart is slowed.

(f). Marinesco-Roseo Complement Deviation Test for Hyperthyroidism.

Marinesco,³⁴ and later Roseo,³⁵ suggested that in states of hyperthyroidism there is sufficient thyroid substance (antigen) present in the blood serum to give rise to the formation of antibodies in the patient's blood. They proposed to test for these antibodies by means of an antigen prepared from thyroid gland removed at operation from a case of hyperthyroidism. In the experiments an aqueous extract of goitre from a case of hyperthyroidism was used as an antigen and the serum of the same patient was used for antibody and the serum of four other cases of hyperthyroidism. In the case whose goitre furnished the antigen the fixation was complete. In the two other cases there was incomplete hemolysis, and in the fourth the hemolysis was complete as in a normal control.

They have also studied this reaction, using ethereal and alcoholic extracts of

the gland. They found the aqueous, alcoholic, and ethereal extracts acted about the same; at times the ethereal extract was more active. In most of the cases of hyperthyroidism there was found either a total absence of hemolysis, or an incomplete or partial hemolysis. On the other hand, the serum of cases of hyperthyroidism never fixed complement in the presence of normal thyroid tissue, with the exception that the serum of syphilitic patient gave a partial hemolysis with ether and alcoholic extracts of a normal thyroid.

No definite opinion as to the value of this test can be formulated at present, as considerable work is necessary to determine its value in cases of latent hyperthyroidism.

(To be concluded.)

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ORIGINAL ARTICLES.

NATIONAL HEALTH INSURANCE.*

BY PETER H. BRYCE,

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At the Fifteenth Annual Conference of State and Territorial Health Officers associated with the United States Public Health Service, held in Washington in May, 1917, the report of the standing committee on Health Insurance was presented. The report begins as follows:

"At the last meeting of this Conference your committee called attention to the vital importance of coordinating health conservation, through established state health conservation agencies, with any system of such insurance that might be established under Government authority."

The necessity for understanding what is meant by health insurance is pointed out in the report, which states:

"It seems worth while, therefore, to point out to this Conference what seems to your committee the essential difference between sickness insurance and health insurance. . . . By sickness insurance your committee understands the system of insurance that is designed to provide for the insured and his family the necessities of life, including medical, nursing, and hospital service, under appropriate conditions after the insured has become ill or disabled. Until he has become ill or disabled, benefits under the system of insurance do not begin to accrue, and benefits cease when he recovers. It will be observed that under this system of insurance the only additional inducement for the worker to make any effort to keep himself well lies in the required weekly payments, which form an almost negligible part of his compensation. The benefits he receives in cases of illness are based, not only on the weekly contribution from the worker, but on contributions from the Government, and the actual benefits the worker receives are certain to be out of proportion to his particular part of the contributions to the fund.

"Health insurance, on the other hand, conveys to the minds of your committee an entirely different meaning, and should be reserved exclusively for the expression of that meaning. The phrase

*It will be noted that this paper has been prepared as a memorandum, with special figures illustrating the situation in Canada, but the principles set forth and the argument made are equally applicable in all the states of the Union.—
P. H. B.

'Health Insurance' clearly means a variety of insurance that tends to insure the continuance of health. It should not be used to describe a system of insurance that pays benefits only in the event of the loss of health, notwithstanding any supposed analogy to the phrase of life insurance."

This committee further reports that, in its opinion, "no sickness insurance scheme should be approved by this Conference or any public health officer under the health insurance measure. Health insurance measures—that is, measures looking definitely toward the conservation of health—are approved by this committee, and it is hoped that every state health agency will approve them, but only on condition that they provide definitely some scheme for health conservation to be administered by establishing health agencies."

These quotations very clearly set forth the true principles which present-day developments have shown should govern any legislature in providing any definite insurance scheme to protect and improve public health. In a pamphlet on "Conservation of Manpower in Canada a National Need," by Dr. P. H. Bryce, interesting statistics are given on page 18, showing how, at the present time, the people and the Government of Ontario spend money for the cure of sickness and prevention of disease. The following services and costs therefor are then given:

Cost of maintenance of patients in hospitals.....	\$2,752,467.71
Grants to houses of refuge and orphanages.....	109,702.23
Expenditure on hospitals for insane.....	1,114,043.82
Expenditure of provincial Board of Health.....	75,000.00
Expenditure of 800 local Boards of Health.....	
Life insurance benefit societies (1916).....	3,061,887.34
Sick benefits and funeral societies.....	1,245,420.37
Total.....	\$8,358,521.47

From these figures it will be seen that the total amount spent in sickness and benefits to health in a single province of 2,700,000 inhabitants amounted in one year to \$8,358,521.47.

TABLE GIVING THE NUMBER OF PERSONS RECEIVING BENEFITS IN 1916.

Number of patients in hospitals.....	85,000
Total inmates of refuges and orphanages.....	11,056
Total inmates of insane institutions.....	6,170
Total members of life insurance benefit societies (1917).....	243,781
Total members of sick benefit and funeral societies.....	172,021

When the total persons benefited in these several ways are added together, they represent a very large number and a very large expenditure; but it is evident that only a small number of persons (one in every twenty-three of the population) receive hospital benefits, which the whole community pays for, while the number in

the benefit societies includes only about one in twenty of the total population of the province.

The figures quoted are abundant evidence of the belief in and practice of the principle of mutual insurance of life, sickness, and funeral benefits, so that there seems no necessity for convincing the people of Canada of the benefits from such insurance. If, however, it can be brought to the attention of the public that these benefits are but partial at present, and could be extended to the whole community with advantage and economy, it would then be seen that almost no limit could be set to which the people might not go in the direction of improving national health, both by health insurance and the care of the sick. As was pointed out in the pamphlet dealing with the conservation of manpower, the enormous improvements which have already been made in the public health of the people of such a province as Ontario through the saving of life in infancy, childhood, school life, and all the later periods amply illustrate the direction in which the expenditure of public money for preventing sickness and death may be properly expended.

The director of statistics of Bavaria succinctly expresses these benefits in the following words: "By means of a careful, organized body of workingmen's insurance statistics, which indicate the course, cause, and consequence of cases of sickness, invalidity, and industrial accidents, the principal dangers which threaten the life of the workmen become known, and the manner in which these evils can be most successfully attacked is evident. There follows, in consequence, a systematic campaign against tuberculosis, drunkenness, venereal diseases, the lack of workingmen's dwellings, unemployment, schooling of the workingmen and their families in social hygiene, enlightenment of the insured by regular lectures, etc."

In spite of the fact that in Great Britain there had been for years a most highly developed system of poor law administration and a public health organization through central and local boards of health, it was seen that in none of the various schemes for caring for the people's health and life was there any adequate and comprehensive scheme for especially taking care of the wage-earners or of persons of what might be called limited incomes. In 1911 the Government, after a thorough study of the existing systems of health and sickness insurance, introduced a bill into the House of Commons for "National Health Insurance," which is entitled an *act to provide insurance against loss of health and for the prevention and cure of sickness and for insurance against unemployment and for purposes incidental thereto*. Briefly, this act, without further preamble, proposes to insure persons of 16 years and upward, employed within the meaning of the act, and any others not so employed who possess qualifications therefor, these to include persons of both sexes,

whether British subjects or not. Such persons were to be provided with

(a) Medical treatment and attendance, with adequate medical and surgical appliances.

(b) Treatment in sanatoria and hospitals for consumptives, payment beginning with the fourth day after sickness began.

(c) Payment of maternity benefits.

(d) Arrangements for payment of any additional benefits through mutual societies.

(e) Provision for compensation for injuries to workmen.

(f) Benefits to be administered through the local county boards, directly or through benefit societies. They shall make arrangements with medical men appointed under the act.

(g) Payments to be made of the amount assessed on the basis of about 10d a week, of 2s/9d by Government, 3s/9d by employer, and 4s/9d by insured person.

Six years have now gone by since the act went into force, and the benefits to all parties concerned, both to insured persons and to the medical officers employed, have proved so great that the British Medical Council has urged the extension of the act to include further payments for specialists' services and the institution of such work as prenatal maternal care, child welfare, etc.

It is not to be supposed that such an extensive scheme, interfering as it did with routine medical practice, and in a large degree with existing systems of public relief, which, under the Poor Law of England had existed for over three centuries, could be introduced without opposition from various directions. Assuming, however, such a law to be desirable and necessary, the question of how the work was to be carried out and how the payment of physicians was to be made satisfactory became the subject of serious discussion. Four methods had been suggested:

1. By a stated per capita payment of medical fees.
2. Payment of fees by visit.
3. Some combination of the two.
4. Direct salary to appointed district physicians.

Each scheme had its advocates, but for eight years it would seem that the confidence of the people as well as the medical experience have been so well met in that of a per-capita payment of fees that the work has now become one of organized public health, in which the principles of preventive medicine take first place, associated with the utilizing of public institutions already in existence and adding thereto others necessary, and organizing at the same time what must become in effect a system of state medicine.

The subject has been dealt with in various publications on what is called "Social Insurance" as adopted in Germany in 1884; Austria, 1887; Hungary, 1891; Finland, 1895; Great Britain, 1897; Denmark, Italy, France, 1898; Spain, New Zealand, South Australia,

and British Columbia, 1902; Russia and Belgium, 1903; Cape of Good Hope and Queensland, 1905; Nuevo Leon (Mexico), 1906; Transvaal, 1907; Alberta, Bulgaria, Newfoundland, 1908; United States for Federal employees, 1908; Quebec, 1909; Nova Scotia and Manitoba, 1910; Switzerland and Peru, 1911; Roumania, 1912; and twenty-six states of the American Union, 1911-1913.

In many of these it has been limited to accident insurance, but the British Compulsory Health Insurance bill of 1911, as already indicated, extends its benefits more widely. This bill has been closely followed by the Mills "Doten-Young" bill now under way in many of the states in the United States. This bill is of interest in Canada because of the similarity in social, industrial, and economic conditions in both countries. It makes insurance compulsory for all normal workers and all others earning \$100 a month or less, some of whom have already been voluntarily insured in mutual societies. The cost annually amounts to about 4 percent of the wages and is borne $\frac{2}{5}$ by the employee, $\frac{2}{5}$ by the employer, and the $\frac{1}{5}$ by the State. The employee is taxed because he is primarily responsible for his own health, the employer because occupational conditions often affect seriously the health of employees, while, further, the business is advantaged by the good health of the workmen, and the State is interested because it gains economically by greater wealth being produced through good national health and less money being spent in suppressing preventable diseases.

This division of expenditure serves directly to include personal, municipal, and governmental schemes for maintaining health and for preventing disease. After seven years' experience of the act in Great Britain a committee of the British Medical Association reported en resumé as follows:

"The degree of unanimity so far disclosed is somewhat remarkable, and suggests that the scheme, which is proving a distinct gain to the medical profession as well as to the public, be still further extended to the dependents of insured persons, and for providing, when necessary, specialists and nursing services, institutional treatment, maternity attendance, etc., beyond what can be provided by the general medical practitioner."

This, with the many other problems which have been pressing for solution, has through the war brought into prominence the need for organizing the many divided social and health agencies in Great Britain under a Ministry of Health. Before the British Hospitals Association Lord Knutsford indicated some of the ideas in the minds of the Government in connection with such a bill. He stated that a Local Government Committee had made a report to the Ministry of Reconstruction outlining the principles which ought to be introduced in such a bill. Some of these were:

1. Provision for abolishing all boards of guardians under the

Poor Law and providing that all the rate-paid work done by them for the poor and lunatics should be handed over to the county councils.

2. County health boards would contract with the voluntary hospitals to perform work, such as that by specialists, which could not well be performed in hospitals managed by the municipality.

3. The work of voluntary hospitals, though scientific, was partial, and did not provide for the treatment of the larger number of cases, as acute contagious diseases, nor did they have facilities for meeting the wide needs of the people by following them to their homes and insuring continuance of treatment.

4. The cost of treatment in such falls on the few, and their revenues are uncertain and limited.

5. The voluntary and state-aided general hospitals would naturally remain for treatment of difficult cases and as centers of specialist activities, and would be especially for those who were able and willing to use them.

It is apparent, since in Canada there exists in all the provinces a large number of governmentally owned or subsidized local hospitals, in addition to what we call the municipally owned hospitals proper for contagious diseases and sanatoria for tuberculosis, that health insurance will be but a step until medicine becomes still more largely a matter of the State. Since many practicing physicians have no opportunities for obtaining hospital experience and advantage, the public welfare must suffer greatly through lack of early diagnosis of some acute contagious disease resulting in an epidemic, while many individual lives may be lost through the lack of facilities for prompt diagnosis.

An effective system of health insurance today implies the existence in every community of expert pathologists, chemists, and bacteriologists to examine diseased tissues and secretions, and to promptly report contagious diseases in order that executive officers may act effectively to prevent its spread. It is apparent, then, that provision must further be made for the training, appointment, and payment of such physicians by every county or large health unit and city in Canada whose services will be available just as today are those of all-time medical officers of the boards of health in our large cities.

CONCLUSIONS.

From what has been reviewed, there seem to be several conclusions which have been determined regarding health insurance:

1. That the system of hospitals of the poor law or charity system and of public health organizations, while having done much, each in its own sphere, in the past, have been too largely based on outworn theories of the *inevitable* and *necessary* occurrence of sickness

and poverty to meet adequately modern ideas regarding the need for and possibility of conserving in a much larger degree the health of the individual and of the community.

2. When it is realized that 26,000,000 wage-earners in England and Germany lost during a several years' average nine days' work annually, and assuming that there are 2,000,000 similar workers in Canada, we can comprehend how the annual loss in wages and through cost of medical attendance was estimated at \$50,000,000.

3. That the existence of an effective system of health insurance, with its system of medical service, unified with that of boards of health, at once makes it possible to analyze the different industries and different occupations as regards the more hazardous employments, and so make special provision for those most dangerous to health.

4. That the investigation of sickness, in its relation to unemployment and low wages, will most rapidly and exactly become the direct means of determining and having remedied the unwholesome conditions of living, whether in the factory or the overcrowded dwellings of workers, and of regulating the hours of labor.

5. That health insurance, by insuring early treatment and efficient hospital care of mothers and infants, has more than any other means served to save to the nation the rising generation under those circumstances most favorable for insuring a vigorous race in the future.

6. That the value of the individual as a producer, as a defender of his country, and as a personal factor in the social constitution of the State is now being everywhere so clearly recognized that no country can longer maintain its economic or national position which fails to make use of every modern resource of science to insure the health, education, and social amelioration of its people.

HEALTH INSURANCE—ITS MEDICAL AND HOSPITAL ASPECTS.*

By JOHN A. LAPP,

Director of Investigations, Health and Old Age Insurance Commission of Ohio.

Among the major hazards of life, sickness is one of the most important. Indeed, it would be voted as the most important hazard by any group of people. "If I can keep my health, I am all right," is heard on every side from those who toil for a living. The misery in the home of the people of meager means, when disabling sickness enters, is beyond description. It need not be described, however, because everyone has seen it. A sort of fatalism possesses most people, and their fear of disease is expressed in their hopes that they may be spared. Yet they know that, unerringly, a certain number are doomed to sickness and death every year, every day, and every hour, and it is only a question as to whose turn is next. So unerring is the law of sickness and death that we can tell, almost to an exactitude, how many people will die next year, and about as exactly how many will be sick, and for how long a time.

Sickness leaves in its train a variety of consequences besides its major consequence—death. A part of the afflicted are disabled permanently and incapacitated from earning a living. Another part are partially disabled and thus physically handicapped. Another part are handicapped economically by the cost of sickness and the loss of earnings. A large number are driven to dependence by their unpreparedness for a severe sickness and by the consequent necessity of relying first on relatives, then on friends, and finally on the public. Any one of these consequences may happen to almost any person. Even the accumulation of a "nest egg for a rainy day" will not suffice to save the most thrifty from the hazard. A man who may be considered well-to-do in the world's goods may, as a result of a single prolonged sickness, be placed in a position of economic dependence. Not 1 percent of the people of Ohio are possessed of enough property to insure them against dependency if they should be stricken with a prolonged disabling sickness.

Under such circumstances, life is a gamble, and the stakes are nothing short of all we hold dear. We do not even have the privilege of throwing the dice. We cannot even verify the result, and from

*Read at the Fourth Annual Meeting of the Ohio Hospital Association, Columbus.

the verdict there is no appeal. We accept the consequences and call it fate.

Fourteen in every thousand of Ohio's population, or about 70,000 in all, will die this year. From 2.5 to 3 percent of the total population will be seriously sick at all times, or 125,000 to 150,000 people, and the number of different persons who will be sick will number from 2,000,000 to 2,500,000. Those who are sick, roughly speaking, will average about eighteen to twenty days of disability. Of the 125,000 to 150,000 who are sick at all times about 12,000 to 15,000 will be sick for less than seven days, while from 60,000 to 75,000 will be sick more than three months, and this excludes the dependents in county infirmaries and state institutions. There are today in Ohio fully 25,000 people, outside of charitable institutions, who have been sick for more than three years.

Facts such as these were the reasons which impelled the last General Assembly of Ohio to create a special commission to investigate the causes of sickness, and to determine whether a plan of health insurance could be organized, under state auspices, which would distribute the cost of sickness, eliminate so far as possible the gamble of life, and thus stabilize society. The commission has been at work for several months in an earnest effort to find out the facts about the extent of sickness which are needed as a basis for an understanding of the problem and for constructive proposals to solve it.

First: To begin with, a commission of this kind should determine whether there is a condition demanding legislative action. If the commission finds there is not such a condition, then it should proceed no further, for it is unwise to attempt to cure nonexistent ills by placing unnecessary laws upon the statute books.

If the commission finds the conditions do demand correction, then it should measure and consider what the actual conditions are. The very fact that a commission is created for the study of a subject presupposes that enough information is at hand to show that conditions demand action, or, at least, warrant action for the public welfare. It is hardly conceivable that the legislature would create a commission to study a subject and provide any considerable appropriation therefor unless there are conditions which are so evident as to warrant the expenditure, and unless the problem is so difficult as to require the services of a special commission. We must assume, then, that the evidence would warrant the conclusion that a definite need is presented.

Second: Having measured and considered the existing need for legislation or action of some kind, the commission's next step is logically to determine what existing laws or agencies there are already to meet the needs, and how well they are meeting them. They must go further and see whether the existing laws and agen-

cies may not be so corrected, revised, or enlarged as to meet the needs. If this is done, and it appears that present laws and agencies cannot be made adequate, then the next step logically follows:

Third: Remembering that "there is nothing that is new under the sun," the commission will try to determine what other states and other countries have done to meet similar conditions, for it is very certain that no subjects are proposed in modern legislation which have not somewhere received legislative attention. Legislative investigators will tell you that they scarcely ever have a proposal without some precedent. Andrew Carnegie once said that his company had lost many millions of dollars by undertaking things without first knowing the whole experience of the industry on that subject throughout the world. It is very safe to say that the people of the states have spent billions in unwise experiments which could easily have been prevented by attention to established facts.

Fourth: Along with a study of legislative experience goes the collection of information, data, and opinions expressed by publicists and administrators, so that the actual operations of laws and their administration may be fully and carefully weighed. It is unnecessary to say that the mere presence of laws upon the statute books does not indicate that they are accomplishing what they were designed to accomplish. Nothing but a study of administrative experience under such laws will warrant final conclusions.

Fifth: A study of administrative experience is essential also in determining how any proposed plan will fit the local conditions and the machinery of administration in the state in which it is to be put in force. Detailed studies are extremely important. The very last point of administration must be determined, or else the structure, otherwise admirable, may not stand the test on account of defects in detail.

Sixth: If legislation is proposed and costs involved, it is very important that the extent of costs and the source from which the money is to come should be determined. In general, the question of costs must be considered (because it is a practical problem); yet, actually, when the evidence shows that a thing must be done to meet an established social need, this side of the question must, to a certain degree, be shoved into the background, because society must do the thing for which it is responsible, regardless of cost.

Seventh: Commissions naturally desire to see their work result in some action. Inaction condemns the fruits of their investigations. If, after studying a subject for two years, it is the plain and clear conclusion of a commission that conditions cry out for action, and the legislature should then fail to enact laws to meet those conditions, the commission must consider that its conclusions have not been so well founded as they supposed, or else that it has not been able to express them convincingly enough to cause action to

be taken. Probably one of the greatest sources of weakness and causes of failure in the work of the legislative commissions is that proposals are not worked out in final details in the form of legislative bills. The framing of the bill to carry out exhaustive and detailed recommendations is the most difficult of all the processes, and failure to prepare the bill leaves a burden on the legislature which it is unlikely to perform as thoroughly as if the definite bill is laid before them for consideration.

The Ohio commission has approached the problem with unanimity of opinion on one point—namely, that the problems intrusted to it are the most important which have ever been considered by a commission or by an American legislature. Naturally, therefore, there has been an unanimity of opinion that no effort should be spared to uncover all of the facts and present them without bias. I can speak truly for the commission that not a single member would favor action of any kind which did not find support in the facts disclosed. The members realize that the issue is too important, and the consequences too vital to the social and economic welfare of the state, to warrant action on anything less than the whole truth.

Health insurance should provide two main benefits to cover the corresponding hazard:

1. Cash benefits to be paid during disability.
2. Medical benefits, including care by physicians, nurses, hospitals, and dispensaries, and the cost of medicines.

Both of these elements are essential to any adequate solution of health insurance, but, if one is more essential than the other, that one is medical benefits. The commission finds that in existing health insurance in the state, cash benefits are provided for to some extent, the prevailing benefit being from \$5 to \$7 a week, while complete medical benefits are almost unknown. Even the cash benefits stop at the end of thirteen to twenty-six weeks in most cases.

Now, if health insurance is to be real insurance, it must cover the whole risk and be for the whole time. Mere insurance, of a fraction of the wages of a man for twenty-six weeks, will not insure that man against the hazard of sickness. To be really insured, a man must be secured against the loss of, at least, a large part of his wages during the entire time of his disability, and also against the cost of adequate medical care, whether that cost be \$10 or \$1,000. The real cost of a serious and prolonged sickness is more in the medical, hospital, and nursing care than in the loss of wages, although the loss of wages must not be overlooked by any means.

Let us see what happens in cases of sickness in typical homes.

A. A man with a family of four, earning \$18 a week and insured for \$7 a week, with no medical benefit, is taken sick with typhoid fever. The man has no savings. If there is a city or charity hos-

pital, the man may accept public relief and be cared for in the hospital. If there is no such hospital, or if the man desires to be independent of relief, a physician is employed to care for him in the home, or the hospital takes him as a pay patient. If he pays either for hospital care or home doctoring, he will find that, at the end of his sickness, he has a debt for medical care which he cannot hope to pay out of \$18 a week. In the meantime his family has been compelled to pay rent and live on \$7 a week, as against a normal \$18 a week. Even if medical care is given free in a hospital, the man will still find a debt for the necessities of life, for his family is so large that he cannot but be discouraged to face his old problems of living and his new problems of paying a just debt on \$18 a week. He is apt to leave the hospital and return to work before he should, and a relapse may bring him back, to add new burdens and to sink him deeper in debt. Meanwhile the worries for the future hinder his return to health. This man has been weakened economically to the breaking point, if, indeed, he is not broken. Another sickness in his family will compel him to ask for charity.

B. This man has a wife and two children, earns \$22 a week, and owns a home worth \$3,000, which he has paid for by the savings of fifteen years. He has health insurance of \$9 a week in a fraternal order for a period of thirteen weeks' disability. He is stricken with a disease which lays him up for six months, and requires the constant care of a nurse and two visits a day from the physician. If he pays his bill at the regular rates and the deficit in the family income, he will be in debt upward of possibly \$2,000. His home may be sacrificed, or he may spend fifteen years more in saving to make up the deficit. Another prolonged illness, and even this thrifty man, who had saved \$3,000, would have to ask the public for relief.

C. This case is similar to Case B, but this man had \$10,000 in property and no insurance. A partial stroke of paralysis rendered him practically helpless for ten years, and required constant medical care. His entire fortune was spent, and, in his weakened condition, he had to begin life over.

Let us now assume a case under a health insurance plan which provided adequate medical care and gave cash benefits. A man with a family of three has savings of \$1,000. He is taken sick with a puzzling malady. The home doctor is uncertain, and has the case given to a local hospital. The hospital doctors give the case a searching diagnosis, and find that an operation of great delicacy must be performed. The patient is removed to one of the leading hospitals of the state, and the operation is performed by an eminent specialist. The patient slowly recovers, and in six months' time is finally restored to health. But what has happened in the meantime to his economic status? The sickness insurance has been

nearly enough to pay the living expenses of the family. They have drawn on the savings to the extent of \$100. There are no doctor bills, and the man begins life almost where he left off, with no great economic handicap. If he had not had the cash benefit, he would still have \$500 of his savings left, but, if he had not had the medical benefits, he would either have died from inability to purchase what he needed or he would have been behind not less than \$2,000, when he was again ready to go to work.

The point in these cases is not to prove the value or necessity of health insurance, but, rather, to point out the relative importance of medical benefits, including complete hospital care and treatment. At present, in some parts of the state, such care is available to the poor, who accept it as a charity; to the semi-poor, who accept it as a semi-charity—a part-pay proposition; and to the well-to-do, who pay liberally for it. In other parts of the state such care is available to neither the rich nor the poor, and facilities are not available to bring patients from smaller places to the centers where hospital facilities abound.

If the foregoing appears as an argument for health insurance, it should be remembered that no one doubts the value of such insurance. It is accepted and approved by all people, just as fire, life, and accident insurance are accepted and approved by all. The only question at issue is whether health insurance can be and should be organized by the state on a universal compulsory basis. That is the question which the Ohio commission considers its duty to solve. The Ohio commission is prepared to express no opinion at this time, but, in conformity with its policy of open discussion, it is frank to say that any plan of health insurance, to get its approval, must provide adequately for medical and hospital care, so as to cover the whole risk, and for the fullest possible development of preventive measures.

To all persons who are impressed by the evidences of ill health and disability, as disclosed by the figures of the first draft, by the partial sickness surveys which have been made, or by common observation, it must appear that correction and prevention are of the first importance. We do not know exactly what part of the disabilities, as shown by the draft, could have been or could now be corrected, nor do we know exactly what part of the average daily sickness could be prevented, but we do know that, in each case, the percentage is very high.

The relation, therefore, of health insurance to sickness prevention needs the most careful study. If health insurance will provide for the cost of adequate medical, hospital, and nursing care, while at the same time tiding the individual over the loss of wages, then corrective and preventive measures can be applied. If health in-

surance will not fit into the scheme of prevention, then the argument for it as a social measure is weakened.

Prevention can best be accomplished in an insurance plan by putting a money premium on it. The city or town which fails to promote the health of its people should be charged extra for its neglect; the industry which weakens the vitality of its workers by insanitary conditions should be penalized; and the worker who dopes himself with drugs or liquor should get smaller benefits or pay an extra price. On the positive side, a premium should be placed on approved conditions in factories and in cities, to the end that if minimum health standards are maintained, or if preventive measures, medical care, and other facilities are furnished, a reduction will be made in the cost. Good sanitary conditions in industries and municipalities should be rewarded, as well as bad ones penalized. Trade unions, fraternal societies, and establishment funds should be encouraged to reduce as far as possible the burden of preventable sickness.

The state is concerned primarily with the whole social cost of insurance. That cost is the total loss from sickness, and not merely the amount paid out for losses. The social motive added to the economic motive makes prevention a fundamental in health insurance by the state. Health insurance by private companies is not concerned as a business proposition with the prevention of disease. It measures the probable loss from sickness, and fixes its premium accordingly. State health insurance, on the other hand, should prevent all preventable sickness as a social policy, and health insurance organized by the state should provide the most complete plan for the prevention of disease. As a social institution, the state cannot do less, because, to quote that great medical leader, Dr. Victor Vaughan, "that government is the best which secures for its citizens the greatest freedom from disease, the highest degree of health, and the longest life, and that people which most fully secures the enjoyment of these things will dominate the world."

Prevention is not a function of insurance when conducted by private corporations. It is a function of any plan of social insurance. Private fire, life, and accident insurance companies distribute losses, but do not necessarily prevent them. The more the losses, the higher the rates. It is merely a matter of adjustment of rates to losses. The state and other carriers of insurance, under a state social insurance plan, should be encouraged to develop preventive measures. The commission is asking that the best thought of the state undertake to help make prevention of disease effective if some plan of social health insurance should be approved by it.

On the corrective side a great new movement is in progress as a result of our awakening due to the war. We have come to appreciate the value of manpower and to give a thought to human sal-

vage. We are taking steps to rehabilitate the wounded and disabled soldiers and return them to self-support and independence, and perforce we shall inevitably turn our attention to the men who are handicapped in industry by accident and disease. We have seen the handicapped man on the street, in the factories, in almshouses, everywhere, but we have not seemed to realize that he constitutes one of the greatest social problems for democracy to solve—namely, the removal of the handicap, so far as it may be removed, and the refitting of the man to take his place in the world's work.

Suddenly, when the war was precipitated, we began to think what should be done for the men who suffer physical handicaps as the result of wounds or disease in the army.

Our neighbor, Canada, offered examples of the solution of the problem. Her rehabilitation work had been done to remove, as far as possible, the physical handicaps of the returned men, and to fit them vocationally for effective labor. Our experts visited Canada, saw the results, and came back enthusiastic over the program for physical and vocational rehabilitation of wounded soldiers. A bill is now pending in Congress, with every certainty of passing, making a large appropriation of money for the conduct of the work. It is a great humanitarian and socially constructive movement. But the question is asked, "Why confine it to the soldiers of the field and not make the same principle apply to the soldiers of industry who are wounded and crippled by the thousands in the factories or on the streets of our country?" It is strange indeed that we have not thought of the problem before, but we are fortunate now in at least having the naked truth before us and in having examples of the solution of similar problems right at hand.

No action is likely to be taken by Congress at this time with reference to industrial cripples, but their rehabilitation is bound to follow in the wake of the rehabilitation work among the soldiers. It ought to have been adopted in the states as a part of the Workmen's Compensation Acts, but it was not, and serious consequences have followed. No system of workmen's compensation can be permanently successful as a social institution without adequate rehabilitation work, and no health insurance plan can ever be successful as a social institution unless provision is made for the men who are handicapped by illness or physical defects. In this work the hospitals must play the largest and most important part.

It appears, from the foregoing suggestions and facts, that the rehabilitation work now in progress and in prospect will place new and, I take it, altogether acceptable duties on the hospitals. Health insurance would bring further needs for the hospitals to meet, and, at any rate, the preventive and corrective measures which are bound to come, either with or without health insurance, make necessary the expansion of hospital facilities. It is probable that, owing to

lack of organization to serve all classes, not one-half of those who need hospital treatment actually go to hospitals, even in cities where ample facilities are at present furnished. If the whole state were properly provided with hospital and dispensary facilities, properly organized, there would be fully four times as many cases cared for as at present. Health insurance would, of course, greatly increase the demand.

How to organize a state-wide hospital service is a problem which needs to be carefully considered, whether health insurance is provided or not. I am indebted to Dr. A. R. Warner, of the Ohio commission, for the suggestion—which I hope he will elaborate further—that state hospital facilities might be organized on the plan of the military hospitals in the war. At every county seat, or at the population center of each county, there should be an emergency hospital with dispensary and ambulance facilities of sufficient equipment to give emergency relief, or, if possible, to take care of the less serious cases, and especially of maternity cases. There is surely no county in the state which cannot provide this minimum. At the larger centers the base hospitals are provided, to which patients needing more extended treatment are removed. At the centers of population, where hospital facilities already abound, there would be the splendid hospitals in which difficult diagnoses could be made and delicate operations performed, or treatment given. Dispensaries and clinics could readily be furnished locally and at the base hospitals. Under this plan a person taken sick in the remote country town has the chance, if he desires it, to obtain the best medical and hospital care which the state affords within his reach. Under a health insurance plan which carries the whole risk this would be given to the insured, in the language of the jurist, “freely and without purchase, completely and without denial, speedily and without delay,” the service being paid for out of the insurance funds.

OBSERVATIONS ON HYPERTROPHY OF THE PROSTATE GLAND.

By L. SEXTON, B.S., M.D., Tulane University, New Orleans.

Someone has said that the function of the spleen in malaria is to enlarge. The same might be said with equal truth of the prostate gland in old men, as 65 percent suffer from varying degrees of enlargement. The derivation of the word from the original Greek is to *stand before*, and this is literally what the gland does before the urethral orifice.

Gross Anatomy.—The prostate gland is made up of two lateral and one middle lobe, surrounding the neck of the bladder, and forming the prostatic portion of the urethra. The gland is composed of muscle, glandular tissue, and stroma, all of which tissue is very susceptible to hypertrophy and growth. Some have contended that this enlargement comes mostly from the suburethral gland on the vesical side of the ejaculatory ducts—a neoplastic adenomyoma or fibromyomatous tumor, very similar to the fibroids of the uterus, originating in the walls of the sinus pocularis. These tumors may be single, but are often multiple, and may be shelled out of their beds in operating very much as an onion is peeled out of its rind.

There are three clinical varieties of hypertrophy—adenomatous, fibrous, and malignant. The first type causes the greatest enlargement and mechanical obstruction to the urinary flow, which necessitates the surgical removal of the gland in the great majority of cases. The malignant type may be either epitheliomatous, carcinomatous, or scirrhus, and constitutes about 10 percent of the cases. Occasionally prostatic tumors are pedunculated. When the enlargement is confined to the lateral lobes, the obstruction to the flow of urine is greatest; the enlargement of the median lobe puts a barrier across the urethra, converting the meatus into an upward-shaped crescent. All three lobes enlarging simultaneously push the meatus into a Y-shape. If you bisect the average enlarged prostate gland, you will find that it is composed of numerous prostatic tumors and muscular tissue that have made a capsule for themselves either out of the surrounding stroma or of the mucous membrane of the bladder wall. The normal prostate, in the average adult at 21 years of age, should weigh a little less than 1 ounce. The average weight of tumors removed is about 3 ounces, while in some cases they have weighed as much as 12 ounces. The tendency of the tumor is to grow upward and backward under the vesical mucous membrane.

causing a considerable lengthening of the urethra, so much so that the length of the normal urethra (8 inches) may be increased to 16 inches.

Causes.—The causes of enlarged prostate are sexual excitement, age, horseback and other rough riding, infections (gonococci), exposure to cold and damp, stone in the bladder, and other irritations and pathological developments of tumors in the prostate gland from constant sexual congestion. While the enlarged prostate is mostly confined to men past 50 years of age, young men who are high liver and of bibulous habits, constantly infecting themselves with gonorrhea, may also have their prostates enlarged. Occasional causes are abscesses and cystitis.

Symptoms.—The growth of the tumor up and under the mucous membrane of the bladder produces a pouch, which contains residual urine, and in many cases is the seat of a beginning cystitis. The straining effort to get rid of the residual urine causes the bladder muscles to thicken at first, but afterward atrophy of these muscles may occur as a result of the continuous dilatation of the bladder. Incontinence of urine may also be expected after the bladder has been dilated to the utmost for a long period. This residual urine undergoes ammoniacal decomposition, irritates the bladder wall, causing a constant desire to pass urine, especially at night while in the recumbent position. Sleep is interfered with, and, more than this, the back pressure from the distended bladder and ureters causes a reverse current and dilatation in the ureters, carrying infection and congesting the kidneys, and sometimes producing pyelitis. Phosphatic calculi may form and become encysted in the bladder or prostatic wall, and produce no particular trouble beyond adding to the vesical irritability; but, if the stone remains loose in the bladder, it adds more obstruction to the outflow of urine. The bladder wall, as a result of its distention, may lose all its propulsive power, causing the urine to be voided very slowly or to dribble away. If chronic nephritis results from the infection, the amount of urine is increased, and the necessity of voiding it more frequently seems to add insult to injury. The stream of urine may not be smaller than normal, but there is less force to propel it. The residual urine is alkaline from phosphates; and mucus, if it extends up to the kidney, is a common cause of pyelitis or uremia. Overindulgence in drink, abuse of the sexual function, and exposure to cold and damp may bring about a crisis in which the urine is suddenly stopped. Straining opposes, rather than helps, the expulsive effort. We cannot always determine the amount of obstruction by the size of the prostate. Obstruction of the rectum and constant straining while urinating cause hemorrhoids, and very large prostates may so press upon the rectum as to retard its function.

Diagnosis.—A patient having to void his urine six times or more during the night, and as often during the day, if past the age of 50, comes either in the nephritic or enlarged prostate class. This frequency may not be so noticeable during the day, due, of course, to the upright position. The enlarged prostate can always be felt by a thorough digital examination of the rectum. Dullness on percussion over the pubis, caused by a distended bladder, indicates prostatic obstruction. (Enlarged prostates are often responsible for a vicious circle established in old men and evidenced by priapism, sexual perversion, and gross indecency.) Relaxing the sphincter is necessarily slow when beginning to urinate, and acute retention makes catheterization imperative. Cystitis and renal symptoms soon follow in close succession. The last urine squeezed out of the bladder usually contains pus and blood, and also albumen from the prostatic fluid with which it is mixed. Casts will also be found if the kidneys are involved. A cystoscope occasionally aids in diagnosis.

When urinary expulsion is impossible, and a catheter life becomes necessary, the patient, before being permitted to catheterize himself, should be carefully instructed in asepsis and the use of a web or rubber catheter. The gum or web catheter is preferable for the patient, but the doctor usually prefers the metallic instrument, as it serves as a long finger to help him diagnose a stone in the bladder, the amount and extent of obstruction, together with increased length of the urethra. In order to enter the bladder, the doctor very frequently needs a variety of catheters, bent at different angles at the end (*coudé*), and of unusual length and small in size, in order to relieve the distended bladder, and even then it sometimes becomes necessary, in emergency cases, to use suprapubic trocar and canula. With the best instructions, the use of the catheter in the hands of the patient very frequently leads to a regrettable infection. The chill and fever which may follow the introduction of the catheter are due to the absorption of the bacteria if the mucous membrane of the bladder is traumatized. A hypodermic of morphia is the remedy. We have, however, known of many patients who have been carefully instructed in the methods of keeping the instruments sterile and properly lubricated living comfortable lives for many years by this palliative treatment alone. The use of the catheter should be limited to the preparation of the patient for an operation and for the immediate relief of a distended bladder, and should not be recommended as a curative measure at all. As the doctor and nurse cannot always be present when it becomes necessary to void, it is important that the patient be carefully instructed in asepsis and lubrication of instruments as just mentioned. In evacuating the bladder (in enlarged prostates) the long curved silver catheter is preferable, but the stem has to be

long and pressed far down between the thighs before the urine will flow on account of the increased length of the urethra. If a patient can pass 8 ounces of urine every four hours without a catheter, his kidneys and bladder may be considered functioning very well.

Treatment.—This is prophylactic, palliative (catheter and suprapubic drainage), and radical, or removing the gland. The usual internal remedies are 5 grains each of boric acid, salol, and hexamethylenamin. Rest, which is very important in all bladder affections, is classed among the best palliative measures in the treatment of hypertrophied prostates. The catheter treatment is recommended only for the aged, infirm, and diseased who cannot undergo an operation, but must have their bladders emptied. Patients requiring a prostatectomy are usually advanced in years, with a trinity of diseases—cardio-vascular-renal—and hence are bad subjects for any operative procedure. Residual urine, diseased bladder wall, infection, and resultant cystitis add other serious obstacles to the operation. Septic catheter, stone in the bladder, pyelitis, or other complications, all taken together, do not present a very promising picture for recovery after operation. The percontra of these unfavorable conditions, which weigh in the balance on the operative side, is that operations drain the infected bladder, relieve the pain and back pressure from the ureters and kidneys, and get rid of the residual urine, pus, and stone if present. Bladder irrigation can be done effectually, and all sepsis washed away, through a large drainage tube, and the constant risk of infection through a septic catheter is eliminated. We knew of no desperate condition in surgery for which more prompt relief can be obtained than is afforded by a suprapubic drainage of these foul bladders.

As a preliminary to any operation, rest in bed must be enjoined, and a diet of milk, cereals, vegetables, and fruit instituted; all meats, condiments, salt, coffee, tea, and alcohol should be avoided, the same as in kidney diseases. Many patients 80 years old have been operated upon successfully, and days of prolonged pain and inconvenience relieved, with many happy years added to their lives. The operative mortality, even in these old cases, should not exceed 4 percent in the hands of competent surgeons. Irrigating the bladder with 2 ounces of nitrate of silver solution (1 to 5,000) introduced into the empty bladder and allowed to remain, though painful, often works wonders in these cases; but this should be followed by daily injections with 2-percent solution of some of the organic silver salts, or with warm boric acid solution, until the bladder is relatively clean before any operation is undertaken. Remember that ether, shock of operation, or absorption of bacteria may unbalance diseased kidneys which are functioning sufficiently well to keep elimination ahead of the production of waste. Do not allow

yourself to be hurried into operating upon these cases until they are thoroughly prepared, as only fools rush in where experienced surgeons hesitate. It is usually preferable to make two stages of the operation rather than to attempt to do too much at one sitting on these bad surgical subjects.

Operation.—After antiseptically preparing the patient, an incision about 2 or 3 inches long is made in the median line just above the symphysis pubis, being careful not to open the peritoneal cavity. After the incision is made through the fat the bladder wall can be seen in the space of Retzius; if the peritoneum encroaches upon the upper bladder wall, it should be held out of danger with a retractor. Two silk sutures are inserted, on either side, into the bladder to support its wall in position while the vesical is opened and drainage tubes put in. If the bladder is not to be opened at the first operation, the wound is packed with iodoform gauze, and left for from twenty-four to forty-eight hours, when, after local analgesia, it is opened and a large drainage tube is inserted through this opening and held in place by sutures. Through this tube or tubes the bladder may be irrigated with hot boric acid solution or sterile water, leaving the removal of the prostate gland to a later period when the bladder is free from sepsis and the kidneys relieved of congestion. The condition of the patient is much more favorable for the second stage of the operation. To raise up the peritoneal membrane in this operation, the bladder should be distended either with air or with 12 ounces of boric acid solution, or by inserting a Peterson bag into the rectum and moderately distending it. The Trendelenburg position also assists in raising the peritoneum. The enlarged prostate can usually be shelled out by the finger, breaking through the mucous membrane at the meatus, following the line of cleavage with least resistance. For the removal of the gland the finger serves a better purpose than cutting or gouging instruments, which increase the risk of hemorrhage. A silver catheter should be held in the urethra by an assistant, as this enables the surgeon to determine the mouth of the urethra, which should be enlarged by the finger tip, while determining if the prostatic portion is yet intact. Among the chief dangers of operation at this period are shock and hemorrhage. The former should be blocked by a preliminary dose of morphine and atropine, and hemorrhage checked by direct pressure, a suture, or packing with gauze. The end of the gauze should protrude through the external opening, and may be removed whenever we are positive the hemorrhage is checked. On the other hand, the introduction of the finger into the rectum and the application of direct pressure with gauze in a sponge-holder will usually prevent the necessity of using either sutures or styptics, which might irritate the bladder. Cuts into the prostate with Bottini's galvano-cautery, double castration, vasc-

tomy, and ligating the internal iliacs to starve the growth of the gland are now very rarely resorted to. Some surgeons prefer a horseshoe perineal incision to remove small and fibrous prostates on account of leaving the drainage in the most dependent portion of the wound, at the same time being able to use instruments in removing the gland.

In operating upon the glands as suggested above we have had many successes and but few failures in relieving the old men.

HOSPITAL LABORATORIES.

By MAX KAHN, M.A., M.D., Ph.D.,

Director of Laboratories, Beth Israel Hospital, New York City.

"Vere scire est per causas scire—To know truly is to know through causes—and he is the scientific physician or surgeon who seeks and determines causes; for only when the cause is deduced can treatment be rational." (Adami.)

It is a curious and surprising fact that in the building of hospitals the construction of the laboratory department is given no expert consideration. Usually after the hospital has been completely erected, certain space, unsuitable for any other purpose, is assigned to the laboratory. It is thus that we find this department frequently located in basements, in out of the way nooks and corners, in out-houses or roof structures built as an afterthought. The laboratory is gloomy, the ventilation unsuitable, and the general conditions such as to make the scientist working there cognizant of a spirit of depression in his assistants and help. It is only, it seems, an Epimetheusian consideration which prompts the hospital authorities to build adequate quarters for the laboratory. Thus we see some of the largest hospitals in the country, erected and equipped for all work (except the most important), and getting along for some years with a makeshift diagnostic laboratory until, finally, either adjacent ground is bought and a laboratory building erected, or an additional floor is built on the roof, or some other arrangement is made to house the scientific department.

The usual architect who draws the plans of a hospital—I have seen several such plans—is aware that the establishment is to have laboratory quarters, and he devotes some space to what he calls a "Urine Room" and a "Pathological Laboratory." The average superintendent of the hospital is able to point out to him how much space is to be devoted to the kitchen, to the scullions' chambers, to the steward's department, and to the doctors' recreation room, but he has not the knowledge to instruct the architect what the requirements of the laboratory department are. If space is lacking, it seems always proper to cut off some of the space devoted to the so-called "Urine Room" and use it for any other more urgent purpose.

So far as the laboratory department is concerned, the hospital authorities do not seem to learn from the mistakes of their neighbors. It takes several generations of laboratory directors, who, dissatisfied with the cramped, unsanitary quarters, are always protesting and pleading for better surroundings, to influence and persuade

the board of trustees to devote money to laboratory extension. The lay board, and, sad to say, the average medical board, judge the value of a laboratory department not by the experiences of other hospitals, but by the work done by their own laboratory staff. If the scientist in charge is a capable, energetic, and learned man, and if, in addition to these qualities, he has much tact, it is usually possible for him to obtain a hearing. Experience shows, however, that the first and second succeeding laboratory directors resign in a dudgeon, and the authorities are compelled to grant certain inducements to the new man, who, taking a lesson from the history of his predecessors, controls his temper and allows the influence of time and the suasion of his work to obtain for his department its just dues.

It does not seem to occur to the trustees to build a fully equipped laboratory and judge the scientist by his work, dismissing him if he is incapable or inefficient. On the contrary, they always judge of the abstract value of a laboratory department for the hospital by the efficiency of the man in charge.

May I take the liberty in the following pages of discussing the question of the department of laboratories, and point out to the lay executives certain matters which appear very important to the scientist in charge of the laboratory?

It must be definitely understood that the twentieth century hospital must have a laboratory—not a makeshift, two by four “urine room,” not a gloomy, unventilated, poorly cleaned cranny, but well constructed, properly lighted, scientifically equipped quarters. A hospital has been defined as a hotel with an operating room and laboratory attached. It is just as improper to have an inadequate laboratory as a dark and dirty operating room.

It is questionable whether the patient gets anything more than hotel comforts from a hospital having a poor laboratory. It is in the laboratory mainly where accurate diagnosis is made. Without laboratory confirmation, no diagnosis is certain. It is true that in many instances the laboratory serves but to make an accurate post-mortem diagnosis. But it is futile to treat a patient the cause of whose disease has not been determined. “*Vere scire est per causas scire*,” said Bacon. It is only groping in the dark to prescribe therapy for an unknown complaint.

The lay patients do not know of the tremendous amount of work that the hospital laboratory does or should do for them. They are aware that somebody must be cooking for them, that somebody is cleaning and washing for them. They see the surgeon dramatically and sometimes melodramatically impressing them with the delicacy of the operation. But they are not aware—cannot be aware—of what goes on before the operation is recommended. How many and various and difficult are the tests made before a diagnosis is possible! Nor does the rare melodramatic surgeon deign to inform the

lay patient that the gall-bladder which he removed as being the cause of all evil has been reported normal by the laboratory. The patient, not knowing better, is minus a gall-bladder and minus a fee, but he still ventures to complain of pain in the same place and with the same insistence. In the medical, in contradistinction to the surgical, ward the laboratory is called on to do more work. It is called on to study the secretions and excretions, to analyze the various fluids of the patient, and to inform the physician in charge what the result is. Treatment, in so far as it can do good, is nowadays directly proportional to the amount of laboratory work. Given the diagnosis, it is a simple matter to treat—if treatment is possible—any case. The rub is in ascertaining the diagnosis.

I wish to discuss very briefly the laboratory question under the following headings: (I) organization; (II) the laboratory director and the medical staff; (III) the budget; (IV) the routine system of running the laboratory; (V) the record-keeping of the laboratory; (VI) the research work of the laboratory.

1. *The Organization.*—I sometimes wonder whether a small hospital is a boon. It is true that the patient is sheltered from the cold and is given his meals in such a hospital, but besides this little is done for him. There is usually no laboratory department—I refer to the small, provincial hospitals—and the physician blunders along, as best he can, without scientific aid, as did the physicians of the bygone centuries.

A hospital having more than two hundred patients should have a well-equipped pathological laboratory, bacteriological laboratory, biochemical laboratory, and serological laboratory.

The various laboratories should be in charge of men especially trained in their respective professions. It is unusual to find a man well studied in two or more of the sciences, and to permit one man to take charge of the work of all the departments is to invite errors and mediocrity in those branches with which he is but superficially acquainted. It may be advisable to have one man as chief of the laboratories, with assistants in the various other laboratories; or it may be well to have all the laboratory men on equal footing. It is usual to have the bacteriologist or the biochemist do the serological work.

The pathological department should have four rooms devoted to it. There should be: (a) an autopsy room, which should be rather large, and arranged, if possible, like a small amphitheater, so that autopsies could be performed before the hospital staff, and the findings discussed, and equipped with the most modern table, with running water and drainage; (b) a microtome room, where the pathological specimens are sectioned and stained; (c) an examining room, where the pathologist has his office, keeps his record, and examines the specimens microscopically; (d) a dark room for photo-

graphic work. The pathologist should have at least one assistant and a technician helping him.

The bacteriological and serological department should have six rooms: (a) a cleaning and sterilizing room, where the glassware is washed and sterilized, and where mediums are prepared, in charge of one technician and a porter; (b) a bacteriological incubation room, where the organisms are incubated and the slides stained; (c) a bacteriological examination room, where the microscopical work is done and the records kept; (d) a serological room, where the Wassermann and other complement fixation tests are performed; (e) a reception room, where patients wait to have their blood taken, etc.; (f) a transplant room, where inoculations from one medium to another are made. The bacteriologist should have one trained assistant and one technician helping him.

The biochemical department should consist of five rooms: (a) the chemical laboratory, where the analyses are made; (b) a hood room, where digestions involving the formation of fumes and odors are performed; (c) a titration and balance room; (d) consultation and record room; (e) a dark room for polariscopic work. The biochemist should have one assistant and one technician.

There should be, in connection with the laboratory, a museum, a general record room, a general library, a general store room, and an animal room, which should be roomy, light and well ventilated. A porter should be assigned to the cleaning of the animal room and of the laboratory as a whole.

2. *The Laboratory Director and the Medical Staff.*—Properly to avoid friction between the physicians and the laboratory department, it is essential that at least one member of the laboratory staff should be represented on the medical board. In this wise all criticism could be directly answered, and all complaints explained or investigated. It seems unjust to the laboratory man who has spent more time to study his profession and who receives less material reward in the pursuit of it, to be treated like an educated employe by the other visiting physicians. It appears a characteristic trait of physicians to lay the blame on the laboratory department when things do not go well with their patients, and often undeserved censure is flung on the laboratory. With the presence of the laboratory representative on the staff, the needs of the scientific department could be better urged and the improvement suggested more impressively defended.

3. *The Budget.*—The laboratory is a source of expense to the hospital. So are the culinary department and the laundry. The laboratory is just as essential as are the other two departments.

Curtail the expense of the culinary department and everybody is dissatisfied. The patients will complain, as well as the doctors,

the nurses, and the help. They are soon made aware that their inner selves are not as well suited as previously. Reduce the expense of the laundry and hygiene suffers. Cut down the expense of the laboratory department and conscience is outraged.

If a hospital has many private patients, it is proper that they should be charged an initial extra fee of five or ten dollars to insure that all laboratory work will be done without further charges. This, of course, can be done in such hospitals as have full-time laboratory men in charge of the various departments. In one hospital in Pittsburgh about fifteen thousand dollars are annually collected from a five-dollar charge to each private case.

Generally speaking, a large hospital is to expect an expenditure of 4 to 5 percent of its budget for laboratory work. In certain hospitals, where men work on part time and their compensation is correspondingly diminished, the laboratory expenses are, of course, proportionately less. In those hospitals which charge a nominal fee for laboratory work to each private patient, and where the laboratory staff is on a whole-time basis, the budget for the laboratory may be reduced to about 1 percent of the total operating expense of the hospital.

4. *The Routine of the Laboratory.*—For the proper and conscientious examination of all specimens, all the analyses should be made by the laboratory staff, either personally or under their supervision. All the routine urine examinations, blood counts, nose and throat cultures, sputum examinations, etc., should be made in the laboratory proper and under the direct charge of the laboratory man. To have ward laboratories where the interns make the examinations at their sweet pleasure is to invite slovenliness, inefficiency, and inaccuracy in all the routine examinations. I do not mean for a minute that the interns should do no laboratory work. I mean—and I am convinced after many years' experience—that the intern staff should be assigned for a certain period of their stay in the hospital to laboratory work, say one-sixth of their time. During this period they would do, under the guidance and with the assistance of the trained workers, all the routine examinations. If several interns spend their time in the laboratory simultaneously, they could be assigned to the various departments for a portion of their time, helping each other out when one man's work gets too heavy.

The method of procedure would be as follows: All the specimens would be sent to the laboratory before 9 o'clock in the morning. All requisitions for blood counts, etc., would also be sent at the same time. The man assigned to urine work or culture examination, etc., would find all his specimens waiting for his analysis. The intern assigned to blood count work would proceed to the various wards with pipettes, etc., and take the blood for the count.

Certain days of the week should be assigned to blood chemistry,

other days to gastric analysis, etc. On these days the intern would pass the stomach tubes on the various patients and bring the specimens to the laboratory. Wassermann tests are usually done twice weekly.

Of course, emergency work will be done at all times. One intern should be assigned in successive order to emergency night work. In this way all contingencies can be met.

5. *The Records.*—All hospital laboratories keep records of the work that they do, but in many cases these records are incomplete and not get-at-able. The following system has proved satisfactory:

All original reports are made on the requisition slip. This should be done in ink and should serve as the permanent record of the work done. These requisitions, with the report, are sent to the laboratory typist, who stamps them in numerical succession. An index card is made out for each patient, and all the requisitions are entered

BETH ISRAEL HOSPITAL DEPARTMENT OF LABORATORIES			
INDEX			
NAME	Mr. John Doe		
DIAGNOSIS	Renal Stone		
	WARD	BED	SERVICE
	A	7	Dr. Z. Y.
DATE	Feb. 2, 1918	SPEC.	Urine NO. 8150
DATE	" 2	SPEC.	Blood Count NO. 8174
DATE	" 3	SPEC.	" Chemistry NO. 8215
DATE	" 4	SPEC.	Wassermann NO. 8306
DATE	" 4	SPEC.	Comp. Fix. Tbx NO. 8311
DATE	" 5	SPEC.	Urine Culture NO. 8470
DATE	" 5	SPEC.	Sputum NO. 8486
DATE	" 6	SPEC.	Phen. sulf. phth. NO. 8492
DATE	" 6	SPEC.	Urine from kidney NO. 8571
DATE	" 7	SPEC.	Urine NO. 8627
DATE	" 9	SPEC.	Blood Count NO. 8811
DATE	" 12	SPEC.	Pathology NO. 9032
DATE	" 14	SPEC.	Chem. of Stone NO. 9227

Individual index card for laboratory work on each patient.

here, so that one can at any time locate all the laboratory work done for any patient, as shown in the illustration.

The typist then proceeds to make three typewritten copies of the original report. One copy is sent to the house physician or surgeon, another copy is filed under the test performed, and a third copy under the name of the disease. Thus, if a phenolsulphonephthalein test is made on John Doe, who is suffering from kidney stone, the original report is filed in numerical order and the number indexed on the index card. One typewritten report is sent to the physician, the second copy is filed under the word "Phenolsulphonephthalein," and the third copy under the word "Nephrolithiasis." Such records would be complete and would serve as a means to teach us the value of our findings with certain tests in various diseases. After several years had passed, the records would prove invaluable.

6. *Research Work.*—Very few capable men will wish to have

anything to do with a laboratory in which research work is interdicted. It is on his research work that the reputation of a laboratory worker depends. His future career and his present contentment are in the work that he loves. To fail to encourage him in this work is to ruin the morale of the laboratory, and usually means the resignation of the laboratory scientist. The reputation of the whole hospital is enhanced by the publication of the scientific researches conducted in its laboratory, and the whole medical staff should insist that research problems be investigated there, for the lay board is not aware of its great importance.

The executive head of the hospital may sometimes not be in sympathy with research work. Usually the superintendent, if he is broad-minded and cultured, will be the most enthusiastic in the encouragement of original investigations. On the other hand, there are certain executives who are trained only in economics and discipline, and who cannot discriminate between the higher scientific services of a laboratory and those of the mediocre type. Time, however, teaches them their lesson, for it is, I believe, difficult to find a scientist who would be willing to forego all the interest that the science has for him in delving in the unknown for the discouraging routine work. It is like taking out the spices and condiments from a meal, for research work is the spice of the laboratory worker's life.

REPORT ON A SERIES OF CASES WITH ACUTE INFECTION OF LUNG AND PLEURA AT CAMP TAYLOR.

By P. J. McDONNELL, Captain M. C., Base Hospital No. 79.

This report deals with a series of 233 cases occurring from January 3 to April 20, 1918, and includes infections of the lung and pleura only. In the group were 98 cases of lobar pneumonia, 59 of pneumonia complicated with empyema, 27 of pleuritis with empyema, 24 of broncho-pneumonia, and 25 of pleurisy, none of which was of the measles-pneumonia group. These were all observed in one ward under the care of the writer, who acted as ward surgeon. During this period and later a large number of like cases was seen in other parts of the hospital, but these had the writer's personal attention. Beginning January 1, a system was inaugurated whereby each new case was entered in a large ledger. Short daily notes on the physical examination, x-ray, laboratory, and such findings were entered. At the end of the illness these data gave a concise and intelligent brief of the case, and such a collection makes a valuable reference.

This particular pneumonia ward contained only actively ill patients. It was fitted up with cubicles, and had the necessary apparatus for aspirating and intravenous work. The nurses and enlisted personnel were especially trained in the care of these very sick men. After the temperature was normal a few days, and no signs of any complication were present, the patient was sent to an adjoining convalescent ward, where he was still carefully watched. This made the ward very active and it was usually filled to its capacity of 34 beds.

Throughout his stay in the ward every patient passed through a routine which had been gradually worked out. Digitalis was started with every case on entrance. The sputum was examined to determine the type of the infection. Daily white counts were made when necessary. Blood for cultures was taken in a large series. Roentgenograms of the chest were made on all except those who could not very well be moved. Often daily plates were made and proved to be of great value. Pleural aspirations were made on all suspicious cases of effusion, and the physical findings were charted daily during the active stage.

The technic of "tapping the pleura" was made very simple. An ordinary hypodermic syringe and needle were used. The route was cocaineized slowly and the pleura was anesthetized with special care. In practically every case where fluid was present it could be with-

drawn for diagnosis in the same syringe, thus eliminating the use of a second and larger needle. More care was necessary with the small needle, as it could be easily broken off, especially in going through a thickened pleura. A larger needle was necessary in very stout individuals and when the pus was thick.

The history of the pneumonias at Camp Taylor was not unlike that at other cantonments. Previous to December the cases were nearly all straight pneumonias. In December a peculiar empyema began to complicate the usual type, and the worry of the medical and surgical services started. At the time when the study of this series of cases was started we had the lobar type, with its complicating empyema, and a few cases of pleuritis with empyema. In addition to this, the service was burdened with measles-pneumonia and empyema group, which was even less amenable to treatment. Those were harassing days, but methods were soon worked out that met the conditions ably. For a period up to the early part of January all empyema cases were sent to surgery for immediate drainage. These fared so poorly and the mortality was so high that all cases were held until the acute stage was passed. A much better percentage of recoveries was made and postoperative complications were lessened. At the middle of March and continuing through April the type of pleuritis with empyema predominated. These were called "primary empyema" cases because no consolidation was found in the lung at autopsy or by physical signs. The onset was an intense pleuritis, which rapidly threw out a serous exudate. The effusion was nearly always massive and required frequent aspirations. In every instance the isolated organism was the hemolytic streptococcus.

At Camp Taylor there were periods when the streptococcus infection seemed far more virulent than at others. We had two large epidemics of measles-pneumonia, and at the end of both the patients were not so ill and the mortality not so great as at the beginning. Since early in May this has also been noticeable in the other types of pneumonia and empyema, as there have been very few deaths on the service. In giving full and proper value to the different forms of treatment this must be taken into consideration, as the results are bound to vary. Any treatment instituted with our cases when an epidemic was waning would show far better results than during an earlier period.

TABLE I.

	Total cases.	Deaths.	Mortality rate.
Lobar pneumonia.....	98	10	10.2 percent
Lobar pneumonia with empyema.....	59	16	27.1 percent
Primary empyema.....	27	8	29.6 percent
Broncho-pneumonia.....	24	2	8.3 percent
Pleurisy.....	25	0	0 percent
Total.....	233	36	15.4 percent

LOBAR PNEUMONIA GROUP.

As shown in table I, in this group of 233 cases there were 98 cases of lobar pneumonia uncomplicated by empyema. Of this number 10 died, giving a mortality of slightly over 10 percent. This low rate is in all probability due to the physical type of patient, for the infection was very severe. Many of the cases had mixed infection, as both the pneumococcus and hemolytic streptococcus were obtained from the sputum. Furthermore, a streptococcus empyema often developed upon a typed lobar pneumonia. In a large number the streptococcus alone was isolated from the sputum.

The onset and course in the lobar group was very atypical to what we had been accustomed. Instead of sudden pain in the side and chill, the patient would give a history of a slow onset with a cold or grippe infection. Usually he performed his duties until his strength gave away. With most of them the temperature dropped by lysis and the rusty sputum was absent. No doubt many of these cases had a pseudo-lobar consolidation with a large area of infiltration. To separate this form from the true lobar type was difficult in all cases and impossible in the many that developed fluid early.

Of the 157 cases from only 19 was the type I pneumococcus obtained. These were as a rule very sick and the serum was used in all but a very few instances. Among the 19 there were 4 deaths, giving a mortality of 21 percent. Everyone of the 4, however, had a severe complication and 3 had apparently recovered from the pneumococcus infection. The first that died was a colored man who was sent to the ward on the third day following an operation in which tuberculous glands were removed from the neck. He was given the serum in full amount, but never showed the slightest benefit. The second man received the serum late in the attack and at a time when scarcely any hope of his recovery was offered. At the same time fluid was aspirated from the chest and the hemolytic streptococcus was found present. The day after the serum was started, marked improvement was noticed and he was tided over the acute stage. A thoracotomy was performed, but he died ten days later. Of frail physique, he was unable to recuperate. The other two cases were very sick, one of them especially so, but, with serum from the start, the temperature came to normal in a week and remained so for almost three days. Then another flare-up occurred. From one on the last day of illness a small amount of clear fluid was aspirated and from it the hemolytic streptococcus was isolated. Both patients were in the ward at the same period and no doubt died of a secondary streptococcus infection. A flare-up of this kind was uncommon. Among those developing empyema the fluid began to form before the consolidation resolved.

The serum appeared of benefit in every case except that of the

colored man. In some the results seemed remarkable. One case had a crisis on the third day of the disease, following the first injection. A second was given in eight hours and the temperature remained normal. The patient had a complete consolidation of one lower lobe and was very toxic, with mild delirium. The physical signs remained present in the lung for several days. Severe reactions were present in about one-third of the cases. In every instance serum sickness followed after a week. Joint pains and urticaria were common. A few had a second attack about a week after the first. All eventually cleared up.

TABLE II. EMPYEMA GROUP.

	Total cases.	Deaths.	Mortality rate.
Streptococcus empyema.....	50	16	32 percent
Pneumococcus empyema.....	7	0	0 percent
Organism undetermined.....	2	0	0 percent
Total.....	59	16	27.1 percent

The total number of lobar pneumonias in the group was 157. Of these 59, or 39.5 percent, developed empyema, a higher percentage than found in the measles-pneumonia cases. Of the 59 empyemas 16, or 27 percent, died. The mortality of the entire pneumonia group, including all complications, was 16.6 percent. This compromises the deaths on the surgical service also.

In the series of 59 cases of empyema complicating pneumonia, as shown in table II, 50 were of the hemolytic streptococcus type, 7 of the pneumococcus type, and in 2 the organism was undetermined. All the deaths took place among the streptococcus infections. In the pneumococcus group not a single death occurred, although every case showed a severe toxemia. From the streptococcus cases these 7 differed remarkably in one respect—namely, in the amount of fluid that formed. This was greatly decreased. The fluid formed slowly and seldom was it necessary to aspirate oftener than once a week. No case totaled over 500 c.c. in all its aspirations, an ordinary amount for one tapping in a streptococcus case.

Of the streptococcus group those that died showed no peculiarity differentiating them from the ones that came through. All were very ill. The deaths on the surgical service after operation could in nearly every case be prognosticated before the transfer was made. We were surprised in one instance. This patient was in splendid condition at time of operation and the pus was well localized at the base. He died, however, two weeks later of a general peritonitis, probably an extension through the diaphragm.

PLEURITIS WITH EMPYEMA.

Organism.	Total cases.	Deaths.	Mortality rate.
Streptococcus.	27	8	29.6 percent

In this series we had 27 cases of pleuritis with empyema, of which 8 died. This was the type most interesting to study and was somewhat of a surprise to all of us. All were completely prostrated and many recovered that seemingly had no chance. Everyone had a most intense pleuritis, of which they continually complained. They presented a typical picture, with flushed face, rapid and shallow breathing, and signs of great suffering. Nearly all were what we termed "rapid fillers," and required almost daily aspirations at the beginning. Several entered with a chest full of fluid and giving a history of only a few days' illness. In this respect they differed markedly from the lobar cases, where a history of preceding infection was usually obtained. Nearly all of the 27 cases came in at the end of March and the first three weeks of April. Many had pericarditis and two a purulent peritonitis, thus showing the severity with which the patient was attacked. In every instance the hemolytic streptococcus was obtained from the pleuritic effusion.

We called this type of case primary empyema, because no signs of lung consolidations were found previous to the pleuritis and effusion. Inside of a day or two the loud leathery friction rub would be replaced by the signs of fluid. In none of these cases were there present the typical tubular breathing and increased fremitus as with consolidation. Any that showed the slightest pneumonic signs were not placed in this group. Quite a number started off with a pleurisy, then showed signs of consolidation, and later fluid. These undoubtedly developed the empyema from the beginning pleurisy and not primarily from the lung infection. These were, however, not placed in this group. During this period we had numerous cases of plain pleurisy. They usually went to normal in a few days, while the infected ones went on to pus formation. It was impossible to predict which would develop pus. A few had large serous effusions in which no organism was found, and these cleared up nicely.

The autopsies performed on these cases showed no consolidation. Usually small patches of broncho-pneumonia were present, but this condition was in all likelihood secondary to the pleurisy. The mortality in the 27 cases was 30 percent. Of the 8 deaths only two had been preceded by surgical interference. These two were protracted case that showed no improvement. Both had thick pus, which was difficult of aspiration. The pus in one was encapsulated over the upper lobe and had to be withdrawn from beneath the scapula. The other six were too acutely ill for operation and died inside of ten days.

This leads up to the question of when to operate. In December and early January we learned that early operation gave us a very high mortality. Nearly 75 percent of those sent in the early stage to surgery died. Operation in this acute stage of the disease seems

a grave mistake. The patient should be first tided over his early infection. The consolidation, when present, should be allowed to resolve, and in the primary empyema cases we should wait until the general septicemia abates. The patients are always in a state of severe shock and pain. Any slight disturbance upsets them, increasing the respiration and pulse. Their courage has completely left them and the very strongest cry out continually. Many are delirious, and still others lie as though in coma and must be aroused to take nourishment. This condition usually persists a week or more. If to a patient in this stage is added the shock of an operation, there is little wonder that most of them pass out. Those of them that die early in the medical service would die much more quickly following the operation, as this might be all that is necessary to take their last ounce of resistance.

Early in January the lesson was made clear when we had much better results with the cases that were late in being diagnosed. In addition to reducing the patient's strength by rib resection or a thoracotomy under local anesthesia, a new focus for infection is opened up. This was illustrated frequently in cases that were running an almost normal temperature and pulse previous to operation. Immediately following there would be a flare-up even with those having only a small localized pleural abscess. Some were very ill for a couple of weeks, and often complications set in, such as pericarditis or pleurisy on the opposite side, showing that a reinfection occurred. To demonstrate how little an accumulation of pus may affect some, a case is recalled of a patient who while home on furlough contracted pneumonia. After six weeks' illness he was sent to the base from his home. In two days 1,800 c.c. of pus were aspirated, and the hemolytic streptococcus was isolated. The patient made a good recovery, following thoracotomy.

Without causing very much inconvenience to the sick man, the fluid may be aspirated frequently—daily when necessary. It seldom needs to be removed oftener than every other day and then only in the "rapid fillers." It will be noticed that gradually the amount lessens and at the same time becomes thicker. Rarely are bad results obtained from aspiration. Of this series 1 case died suddenly three-quarters of an hour after 900 c.c. were drawn off. It was, however, his second tapping and he was in serious straits. Respiratory failure suddenly set in and he passed out in a few minutes.

The time to permit operation for permanent drainage is usually two to three weeks after the onset. In a favorable case the temperature then is usually well lowered, the pulse is of good character, and the body has attained a certain immunity. The patient is usually eating well and his mind is entirely clear. This is true of the pneumococcus as well as of the streptococcus, as all of the 7 pneumococcus cases recovered on this form of treatment.

It was also learned that there was no immediate hurry in aspirating when a case was carefully followed from the start. Evacuation of the fluid in the first few days did not lessen the symptoms, but, on the contrary, often increased them. Five hundred c.c. was not a large quantity and seldom caused much embarrassment. Many cases get over their acute attack with a chest full of fluid. In the early days we used every method to make an immediate diagnosis of effusion. The patients were rayed and needles were inserted daily. Later on we waited until we felt there was considerable fluid present, except in cases that showed embarrassment and those not doing well. The diagnosis in these cases is at first quite difficult to make, but becomes easier after a short experience. The textbook description did not coincide by any means with the physical signs found, but one learns that, when real flatness is present over considerable area, fluid will nearly always be obtained. Add to this sign dry and distant tubular breathing and displaced apex, and the diagnosis is complete. Where consolidation is still present with the fluid, tubular breathing of the loudest kind is heard. After reading text-books on physical diagnosis this is very disconcerting.

Not only is there danger in operating too early, but there is also a certain element in holding off too long. It will then be noticed that the temperature and pulse rises again progressively. Drainage should be instituted at once, as the infected fluid usually is the cause of the secondary rise.

Operation, moreover, should not be delayed until numerous pleuritic adhesions have formed. Then the pus becomes loculated and complete evacuation is almost impossible. Occasionally fluid, once free and easily drained at the base, becomes localized high up near the apex, rendering it difficult to get at. The pleura also becomes very thick and retractions of the side will result.

No case of the entire 86 cleared up with aspiration alone, although a series was faithfully tried. Usually the pus became pockety or was too thick to drain off. Judging from our series, it does not seem like good therapeutics to try as a routine for this result, as apparently it happens only occasionally. One case, who had cleared up from an empyema following measles-pneumonia with aspirations alone, returned in a short time with lobar pneumonia on the same side. His recovery was quite protracted, as he had several flare-ups. In another case outside this series 5 c.c. of thick pus containing streptococci were aspirated from small localized area. The place never refilled and the patient was returned to duty. Such results, however, are but isolated instances and seem ideal, especially in severe infections and with the present methods of treatment.

BRONCHO-PNEUMONIA.

There were 24 cases of broncho-pneumonia, with 2 deaths, a mortality of slightly over 8 percent. This rate was a little less than in lobar pneumonia group. Quite a number began as broncho-pneumonia, but developed consolidation, and as such were placed with the lobar group. One of the 2 cases that died presented an interesting picture. Coming in with only a small though definite amount of lung involvement, the patient, a colored man, acted peculiarly, not unlike a catatonic. After the first day he would not reply to questions, would steadily hold his arms and legs in one position, and would breathe very rapidly. There were intervals in which he became almost normal and at times his temperature would drop. His eye-grounds were negative. The Kernig at times seemed positive and then again he would relax completely. Other reflexes showed little changes. The spinal punctures on the first two days were negative, but on the third the fluid was full of pus cells. No organism was found. He died in less than a week and at autopsy a very small spot of hemorrhagic encephalitis was found on the surface of the frontal lobe. Cross-sections showed the pathology admirably. The hemolytic streptococcus was again found to be the offending organism.

PLEURISY GROUP.

Of straight pleurisy, uncomplicated, we had 25 cases without a death. The group was interesting in two respects. In the first instance nearly all occurred at the same period when the primary empyema cases developed in such numbers. And secondly in the first few days of the illness it was most difficult to differentiate the two types. It was impossible to forecast which would develop pus or which would clear up with the ordinary symptoms of pleurisy. Seemingly it was a matter of degree of infection or ability to combat it. After a few days all symptoms would disappear wherever fluid did not form. In some, however, the physical signs would remain much longer. Many of these could easily be mistaken for a pneumonia with a small patch of consolidation, as with impairment present the breath sounds were markedly accentuated over a certain area. Typical tubular breathing would persist in some cases for a week with the patient feeling perfectly well. This was a most disconcerting physical sign and one apt to be given the wrong interpretation. Apparently it occurred only when there was present a very thin layer of serum. The x-ray would demonstrate a light shadow and usually a few c.c. could be aspirated with a small needle. All had to be carefully observed as in several instances a flare-up occurred and empyema developed. Three of the cases had large serous effusions, which cleared up after aspirating. This group, occurring in large numbers at one certain period, with

many developing a purulent effusion, offered a most interesting study from a diagnostic and prognostic standpoint.

TABLE III. LEUCOCYTE COUNT. AVERAGE HIGH COUNT.

	Average high count.
Pleurisy.	13,100
Broncho-pneumonia.	16,200
Lobar pneumonia.	20,400
Primary empyema.	27,000
Pneumonia empyema.	27,500

As shown in the above table, the leucocyte count in the entire series of 233 cases ran about as might be expected, being highest in the most toxic group. The lowest count was in the pleurisy and the highest in the empyema group. Nothing new was learned. Where daily counts were made, the change in the condition of the patient was usually reflected by the leucocytosis.

SIDE AFFECTED.

Of the 157 cases of pneumonia, in 90 the right lung was affected, in 56 the left, and in 11 both lungs. Of this number 59, or 37.5 percent, developed empyema, 29 in the right pleura and 29 in the left. This shows a marked proportional preponderance of the infection for the left pleural cavity. This same tendency was apparent in the cases of pleuritis with empyema, where 17 of a total of 29 occurred in the left pleura. This is likely a coincidence, and doubtless no significance can be attached to it.

COMPLICATIONS

The complications in the lobar pneumonia and empyema groups were numerous and severe. Among the commonest in the lobar cases was pleurisy, and it was rare to find a patient who did not complain of pain in his side. Almost 10 percent developed a slight effusion, which in some cases was demonstrated by a small needle. This disappeared slowly, and the case had to be carefully watched throughout, for, as mentioned before, occasionally the fluid became infected from within and a purulent effusion formed.

Pericarditis occurred in about 8 percent. In only 3 cases was there a well-developed effusion and 1 of these died following a thoracotomy. In the other 2 the fluid disappeared without leaving any bad effects. This complication was always a serious sign because the cases were the very sickest. Delirium was constantly present at the start. In nearly all the rub disappeared as soon as the acute symptoms subsided, and in none of this series was pus demonstrated in the pericardium. The rub in most of the patients was heard at the start, but with several it was not noticed

until the pleuritic effusion began. With the primary empyema cases pericardial pain was often the first symptom, and in auscultation both pericardial and friction rubs were heard. The complication was far more frequent in left than in right side empyema.

Otitis media was the most frequent complication, occurring in about 10 percent. It was not usually of serious omen, but often produced a sudden rise in temperature. It was present at all stages of the disease. The otologist made daily rounds of the ward and often relieved the situation by a paracentesis. Several of the pneumonia infections were definitely and immediately preceded by an otitis, and these were sent to us from the head surgery wards. In all likelihood the ear in such cases was the primary focus. One case followed a tonsillectomy and died within four days after the operation. Only two developed mastoiditis, one being double. Both made good recoveries.

Deep jaundice was present in 5 cases. These comprised a most toxic group, as the severity of the infection was manifested by 3 deaths. One of the others was unconscious three days and was in desperate condition. From the onset all were intensely ill and showed a very severe septicemia, the 3 that died becoming delirious soon after entrance. The cholangitis was accompanied by numerous infections elsewhere.

Three developed a purulent peritonitis, all of whom died. At the same time all had a hemolytic streptococcus empyema. One was late complication and followed about a week after a thoracotomy. The other two were primary empyema cases that ran a very septic and rapid course, dying inside of a week. At autopsy considerable free pus was found in the abdomen.

One patient developed an ileus over night. He had a very painful pleuritis and pericarditis, and was just transferred from the cardiac ward. Inside of six hours there was a complete obstruction which could not be relieved by the usual measures. He was then transferred to surgery and the abdomen was explored. No pus was found. He died three hours after laparotomy. The sudden onset over night and the complete paralysis of the bowel were striking features.

Abscess of the lung occurred in two patients. One, who had also a streptococcus empyema, died. This patient was desperately ill from the start, but lived about two weeks. The other had an abscess in the right midlobe, where the roentgenogram plainly localized it. He spat up considerable quantities of purulent material, which was rich in streptococci. His pneumonia was not of a severe grade, but for five days before the cavity drained into the bronchus he complained of a severe headache, which could not be relieved. After four months he was sent to duty from the convalescent hospital.

Several cases developed body abscesses, usually on the back. Most

of these occurred in the empyema group, and were largely due to the infection being carried back by the aspirating needle. This danger is increased if the suction is not shut off before withdrawing the needle.

Four of the patients had a well-marked meningeal irritability, but in all of them the spinal fluid was negative. The meningismus usually cleared in about three days.

We had two most interesting cases of slow resolution. Both presented marked impairment, with distant tubular breathing and rales. The x-ray showed shadows to correspond. No tubercle bacilli were ever found—only the streptococcus. One case ran a temperature around 103° steadily for nearly three weeks after the initial drop, and was sent to the tuberculosis observation ward. There he cleared up entirely and after three months' time was back to duty. The other patient showed the consolidation, but the temperature remained normal after once coming down. He was also returned to duty, but not for three months. The measles-pneumonias presented this same picture, and a large number of them were held as tuberculosis suspects. None of this series developed tuberculosis.

Pyopneumothorax complicated 2 cases. These were interesting clinically, as they gave all the classical signs of air in the pleural cavity. The exciting cause was not determined, as both had previously been aspirated, and the condition was present before transfer was made to this pneumonia ward. One died in the medical service without operation. The other, who was also extremely sick, made a remarkably good recovery following thoracotomy. Another case, later than this series, is doing very well following operation. Judging from our few cases, permanent drainage should be instituted with these just as soon as in the pyothorax cases. They suffer more from compression symptoms, and it is difficult to aspirate the pus on account of air present.

Laryngitis was a common accompaniment—in some a severe and persistent type. A purulent infection of the conjunctiva was observed in 1 and a subconjunctival hemorrhage in another. Nephritis followed in 1 case, but only after he developed a suppurative otitis in convalescence.

Abdominal tenderness was noted fairly often, due to the pleurisy that so commonly was present. With other signs it was noted in the peritonitis cases. Many showed a marked tenderness and rigidity on the right side, but sufficient signs at the base could always be found. One of the patients was about to be prepared for an appendectomy at a hospital in the city when the base ambulance was sent for him. The attack came on suddenly at night while the man was in town. He presented a difficult picture, as the pleurisy had not developed far. One case with a pleurisy had a gangrenous appendix.

Three of the men developed mumps and one measles in the entire three and one-half months. Two of the mumps cases showed up on two successive days at a time when a big epidemic was starting in the camp. Both, no doubt, brought it in with them and were incubating while going through their pneumonia course. The temperature had been normal a few days when the parotitis appeared. One had a type IV and the other a streptococcus infection. The third case was contracted in the hospital, as he had been in longer than the usual incubation period. He also had a streptococcus pneumonia. The measles developed a few days after the patient came in. The ward was never quarantined, but we had no ambulatory patients, and cubical isolation was rigidly maintained at all times.

Two patients were sent to us following mumps. One had a fairly severe broncho-pneumonia that did not clear up for nearly three weeks. The other had a streptococcus empyema that kept filling rapidly. He died in a short time, before the fluid showed much pus.

Two of the men had a secondary lues and one of them died with a huge consolidation. The other, with his consolidation, developed a pleural effusion and pericarditis, and later on mumps. Two had a tuberculous infection—one of the cervical glands, the other of the lungs. The former, a type I, died. The latter recovered from his pneumonia, but was later discharged from the army.

One fatal case had a diagnosis of hemolytic jaundice, made when he was 9 years of age. He had a history of two acute upsets, which had been ascribed to the condition. At one time a transfusion was performed. The skin pigmentation was always present, but he passed his army entrance examination at night. He was of splendid build, and at the time of his illness belonged to the officers' training school. There were present the marked pigmentation, a very large spleen, some anemia, and fragility of the red cells. He had a most severe infection, with consolidation of both lungs, complicated with a double purulent otitis media, from which he was almost completely deaf, a pericarditis, and a streptococcus empyema.

Another patient gave a history of diabetes insipidus since childhood. He made a quick recovery from his pneumonia. In his convalescence he developed a severe pleuritis, from which he easily recovered. It was noticed that he drank and voided tremendous quantities. His case was carefully worked up, and it was found that thirty or more quarts daily was his usual output of urine. A spinal puncture gave no relief; neither did pituitrin subcutaneously or intravenously. The disease, apparently, did not lessen his resistance.

In the group of 86 empyemas no case had pus in both pleural sacs. This seemed strange, as very often at the onset both pleura seemed equally attacked. This was especially true of many of the primary empyema group. In several a small amount of sterile

fluid was obtained on the opposite side. It was also noticed that the side first affected would occasionally clear up and the opposite side develop the effusion.

During the past winter the group of streptococcus infections opened up a new and big field for study. Nearly everything was blamed to the streptococcus, and justly so. The prevalence and virulence of the infection made it a problem at Camp Taylor, and a tremendous amount of labor was put on it. The medical, the surgical, the laboratory, and the roentgenological service were heavily taxed. A great deal was learned about it, especially along treatment lines, but a great deal more remains to be discovered. Its mode of entrance and along what channel it travels offers an interesting line of study.

During the coming winter the soldiers will doubtless be better protected against the infection. We know how rapidly it spreads, and so isolation should be practiced in every case as it shows up. Treatment initiated early will clear up the condition rapidly and prevent most of the complications. After the lungs have become infected, there is no advanced line of treatment. We always have hope of a curative serum. When a purulent effusion forms, drainage is the only method of getting rid of it. It does not seem likely that any of the cleansing agents used in washing out the pleural cavity will stop the effusion. It will be very interesting to watch what the next cold season brings forth, what the character of the epidemic will be, if we have another, and what new methods will be evolved in fighting it.

The above work was done entirely under the direct supervision of Major Walter W. Hamburger, chief of the Medical Service.

THE EDWARD L. TRUDEAU INSTITUTION IN FRANCE.

By WM. CHARLES WHITE, M.D.,

Recently Chief, Bureau for the Care and Prevention of Tuberculosis, American Red Cross in France.

"With our friends the Americans he was a figure almost legendary, comparable with Laennec or Pasteur. He merited a book. Edward L. Trudeau is within his right in history. His name will pass to posterity as that of a great crusader. The world will guard the memory of this generous founder of popular sanatoriums in America, of this philosopher-doctor, this courageous philanthropist, who had the good fortune to concentrate his intelligence and



Fig. 1.—One of the châteaux, situated in a beautiful woodland region, which have been taken over by the Edward L. Trudeau Institution in France for use as a tuberculosis sanatorium.

assistance on the defense of those suffering from tuberculosis." Thus in 1916 wrote Professor Maurice Letulle of America's beloved physician, who was of French parentage, but born in America, and who was one of her most priceless possessions.

Our part in the struggle when the American Red Cross came to France in the summer of 1917 was to assist in the fight against tuberculosis—a fight serious at any time, but thrust into prominence in all countries by a war which produced food shortage, overwork, congested housing, severe prolonged strain, and new, unnatural conditions for large groups of the population.

In France, the great battle-ground, as she has been for ages in the world struggle for freedom, conditions naturally were most severe. Besides her own normal population, she was traversed by all the allied armies passing to and from the war zone—British,

Americans, Italians, Belgians, Portuguese, Serbians, and Africans, as well as her own wonderful troops—and in those departments outside the war zone she was the haven of all who were displaced by the war, refugees before the German advance, repatriates from behind the central lines, Belgians, Serbians, and many others in small groups. In all of these there would have been enough tuberculosis at any time to occupy a great force of people; it was multiplied by the conditions of war.

France was awake to the demand and coping with it in the same spirit with which she has met all that has been forced on her, but there was also great need for our help and she accepted it with the generosity which has spelled the heart and minds of her leaders. We were not needed to show her the way. Was she not the home



Fig. 2.—A vista down the beautiful woodland park surrounding the buildings of the institution.

of Laennec, who taught us how to detect disease in lungs, of Villemin, whose name stands preeminent in all the foundation knowledge of the tubercle bacillus, and of Calmette, the father of the dispensary, the greatest implement of all in the modern warfare against tuberculosis? Was she not a country with model sanatoriums at Bligny, Berck, Hauteville, and many other places, and with dispensaries and nursing schools springing up everywhere? Had she not Letulle, Besançon, Guinard, Kuss, Rist, Bernard, and Courment leading the way? Any who thought of teaching soon found that we were needed not for that, but rather to help in the great burdens arising from the emergency which crowded her own population into one quarter and all the allied armies into the other three-quarters of her territory.

The most urgent need was help for her tuberculous civil population, refugees and repatriates, dislocated homeless, and transient and broken families.

Early in the autumn of 1917 the first opportunity for independent

work came. Prior to that time we had given assistance to French hospitals and organizations already organized for the task. But in October members of the English Mission of the Society of Friends asked us if we would undertake to reconstruct and operate a property near Paris which had been offered to them by the Department of the Interior for the care of tuberculous refugees. This property lies in two sections about a mile apart, covering about a hundred acres, with three large buildings and a number of typical French outbuildings. It had been purchased before the war by the Department of the Seine to fulfill a plan for a garden city of which Mr. Henri Lucien was the originator. It is only twelve miles from Paris, easily accessible by train or automobile.

Conferences were at once begun with the Department of the Seine, the Department of the Interior, and the English Friends; and



Fig. 3.—A group of convalescents enjoying the open air.

the whole property was turned over, rent free, to the American Red Cross for the duration of the war and six months thereafter.

By the middle of November conferences and plans were completed and a group of American Friends began the work of cleaning, papering, plumbing, and equipping. On Christmas day, 1917, six weeks after the work was begun, the first three tuberculous refugees were admitted in the midst of the confusion of work still under way.

Through the generosity of private owners it became possible in the following months to secure two additional châteaux in the immediate neighborhood on the same terms as those granted us by the Department of the Seine. After obtaining the permission of the owners for all changes made in the buildings the American Red Cross agreed to pay for them and for the current taxes and insurance.

We decided to use these five large buildings and the adjoining land for the tuberculous refugees and repatriates, chiefly women and children and their families.

The largest of the buildings, known as the Château Hachette, was turned into a hospital of eighty beds for women with active tuberculosis. The next in size, called the Sertillange Home, was converted into a hospital for eighty children. The third, just across the road, was made a receiving ward of forty beds into which all children were taken for two weeks' isolation before entering the hospital proper to protect the other groups against infectious diseases. Following this, the orangerie of the Hachette house was converted into a ward for twenty-five tuberculous women, and finally this whole group was augmented by wooden barracks to take care of twenty-five children of tuberculous families; in all, 475 beds. To these were added other barracks for dining rooms, kitchen, school, and play rooms.



Fig. 4.—One of the wonderful views which abound in this region.

In all of France one could not have found a more pleasing or beautiful spot into which to receive the unfortunate sick driven from their homes by an invading army. All the buildings are grouped around a woodland park of many acres with wonderful vistas and walks in which the children are allowed to play, and on the terraces and slopes are ideal places for those who need rest, fresh air, and sunshine.

Not all has been quiet, however. For many nights the patients were reminded of the frightful region from which they had fled, as the many Gothas dropped their bombs on Paris or the long-range cannon threw its shells in the direction in which the new hospital lay. At such times our American doctors and nurses were roused to carry the sick and fearful into the cellars of the old château and to quiet the fears of those in whom the bursting bombs aroused such horrible memories. Again, in spite of all its beauty,

sadness crept over the scene only too often. When Major Murphy first came to see it and the patients asked the privilege of singing the Marseillaise, it took some blinking to hide the tears.



Fig. 5.—A row of the cottages erected on the Malabry estate for tuberculous families.

This group of 450 beds did not begin to satisfy the demands that came to us. There was still, as everywhere, the homeless in refuge that would not separate from its sick. All were full of the hope of



Fig. 6.—A group of members of the Society of Friends in their working uniform. They do all the work about the estate.

returning to their former homes when the devastation had ceased. To provide for these we took the Malabry estate, two châteaux, and sixty acres of land, and opened our "school for housing." In planning Malabry we aimed to meet an emergency and at the same

time to create an organization which would be of subsequent value in the reconstruction era. Each houseless refugee family with a consumptive member is given a small wooden house fitted out anew; the whole family, well or sick, will be under constant medical supervision, and when the war ends the family will be sent back, house equipment and all, to the village of its choice, with the new and priceless knowledge of how to live with a tuberculous member in the household, to care for him and to protect the others. They will be taught new trades, if necessary; the children will be taught by the teachers of the French department of education in open air schools. We are to begin with a colony for two hundred houses, approximately one thousand persons, with schools, workshops, stores, and a chapel. Each household will become a center of education in the village to which it returns. We have learned lessons from the housing of vast armies in the field under healthy conditions, and it is hoped that through this demonstration the possibilities of simple installations will be established for our whole tuberculosis campaign.

To this entire group of activities, caring for fifteen hundred refugees in which tuberculosis is a common factor, we gave the name of Edward L. Trudeau, Frenchman by origin, American by birth, who gave forty years of his life to the fight against the disease. His name honors both the American and French nations, as well as this new institution, and helps to draw the two republics together in another common battle. We only would that we could honor him more.

CONGENITAL DOUBLE FACIAL PARALYSIS.

With Also an Absence of Lateral Movements of the Eyeballs, Mandible, and Tongue.

BY FRANK R. FRY, A.M., M.D., St. Louis,

Clinical Professor of Neurology, Washington University.

Synopsis of the Case.—The subject is a girl 11 years old in whom there is a complete absence of mobility in the distribution of the seventh nerve on both sides of the face. There is also an absence of all lateral movements of the eye-balls, of the mandible, and of the tongue. There is also a teratological absence of the left breast and a teratological deformity of the left hand.

W. B., female, aged 11 years, was sent to me for examination by Dr. R. N. Crews, of Fulton, Mo., June 27, 1918.

That she has a facial palsy of both sides is evident at a glance, and only a few minutes' inspection is necessary to reveal that it is complete and total. There is no mobility whatever, except a slight drawing-down at the corners of the mouth; this is evidently accomplished by the platysma, and is a little more pronounced on the left side. She is a well-nourished, healthy child, with good-looking complexion and hair, yet the absence of animation in her countenance is most striking. When instructed to close her eyes, the mask effect is complete, the clear sclera presenting through a palpebral fissure a little over a quarter of an inch wide on each side. The skin is clear and smooth over the whole face, and only slightly thinned over the forehead and over the malars and nose. There is no corrugation, except slightly about the eyes and mouth. The upper lip is thin and slightly pursed, and the lower slightly everted. There is very little drooling, and only when speaking or eating.

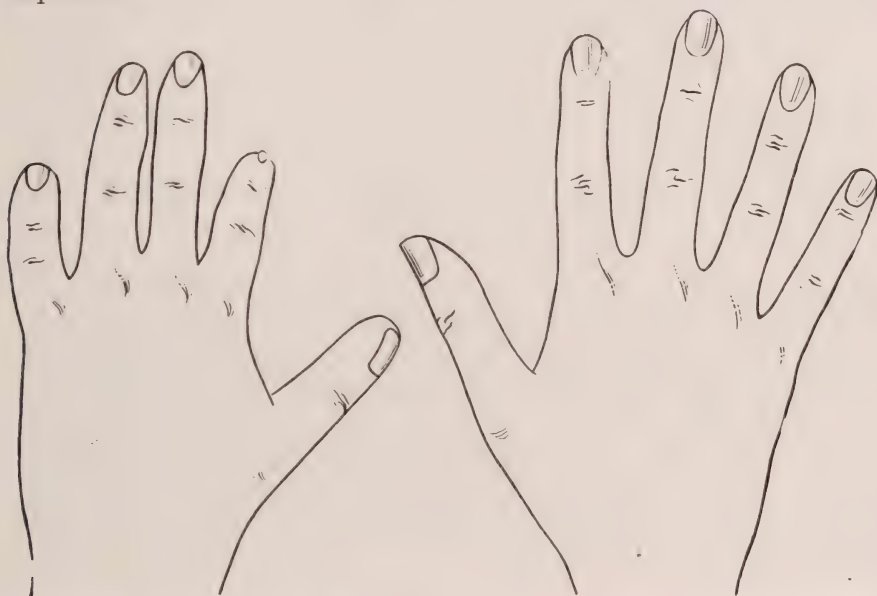
There are no lateral movements of either eyeball. There is a good range of vertical movement, and it is the same for each eye. The downward range is greater and seems quite full; the upward range is possibly somewhat limited. There are no oblique movements, or, if any, so slight as to be questionable. The pupils are equal, and react well to light and to accommodation. The ciliary function is intact. In making the above observations I had the valuable assistance of Dr. Jos. W. Charles, who joined me in examining the eyes.

There is no lateral movement of the mandible. The members of her family seem quite aware of this, and her father, who accom-

panied her, offered to demonstrate her manner of masticating by furnishing her some gum to chew. The range of vertical movement of the jaw is possibly somewhat limited, but not much, and the strength of contractions seemed full enough.

The tongue is atrophied and corrugated; somewhat more so on the left. Its movements are limited and wobbly.

The range of movement in the soft palate and uvula is also quite limited. It also has a corrugated appearance; more so on the left. The whole faucial surface seemed to be exceedingly sensitive, making the examination of it difficult, although the patient tried to acquiesce.



Tracings showing the relative size of the right and left hands and the deformation of the left.

The left mamma is entirely absent, the merest semblance of a nipple persisting. She seems to have fair strength in the pectoral muscles of this side, but the flat, attenuated appearance of the breast suggests absence of some of the muscle substance. The right breast is well developed for a girl of her age, and, by contrast with the other side, has the appearance of being overdeveloped.

The appearance of the left hand is so evidently teratological that only a brief description is necessary. The index and little finger are so short as to be quite out of proportion to the other digits. There is a very rudimentary nail at the tip of the stubby index. The whole hand is considerably smaller than the right. There is no atrophy, and she uses it very well, but not so freely as the right. The muscles of the arm are all present and proportionate, although the member is somewhat smaller than the right both in length and general circumference.

There are no sensory defects anywhere, and no atrophic phenomena, except those mentioned in the face and tongue.

In intelligence and character this little girl seems quite up to the average of her age.

Her speech is, of course, very defective; in fact, even to her father it is almost unintelligible. However, her brother and sister and her teacher understand her "lingo" very well. She does not use a standard sign language. Although she writes very well indeed for one of her age, she does not converse in this way; nor does she use much pantomime beyond some coy little movement of her shoulders and hands for expressional purposes.

Although her face is so utterly expressionless (the more so on account of the limited eye movements) and her speech so defective, her demeanor is otherwise so alert that one is quickly assured of her intelligence. I have in the record specimens of her handwriting and figuring, which are very creditable.

The family history furnishes no items of importance, nor are there any connected with the gestation or birth.

I have recorded this case for the general interest (and I may say fascination) which attaches to it, but more especially to bring it to the attention of those who are more technically informed on teratological questions, for it is in this direction that it has a special scientific interest. This is too extensive to discuss satisfactorily in a brief paper of this character, even if the writer were able to do so. I may only suggest that the deficiencies here present are of the type due to germinal defect as distinct from the teratological types caused by mechanical processes in utero, as, for example, club-foot, cyclopia, spina bifida, etc.

CURRENT NOTES

Arbuthnot Lane on Fractures in War.

In *The Practitioner* for October is an article by Lane on Fractures in Warfare, from which we take the following conclusions as to the operative treatment of fractures produced by projectiles:

1. That only in very exceptional circumstances is it advisable to fix fragments of broken bones together by means of plates and screws while the wound is foul.

2. That if, for certain reasons, such a procedure is deemed necessary, screws should not be inserted near the broken extremities, but as far from the seat of fracture as possible.

3. That it is advisable to postpone operative interference until the wounds have healed for some considerable time and until the tissues are, in all probability, free of organisms. This can usually be determined with reasonable certainty.

4. That if any apparently septic focus is observed during an operation, a culture and a vaccine should be obtained from it, and employed at once should symptoms of infection of the wound develop.

5. That, should there be any definite suspicion of the presence of latent sepsis, irrigation by Carrel's or similar method must be adopted at once. If not, the wound should be closed completely at the time of operation.

6. That every attempt should be made to avoid any shortening of the limb, or to reduce it to a minimum.

7. That the apposition of the whole areas of the broken ends is not necessary, since the interval will fill up subsequently by bone if suitable means are adopted. Fragments of bone or callus should be saved and employed to fill any interval between the pieces of the shaft.

8. That much heavier steel plates are required in this class of case than are usually employed in the less comminuted fractures of civil life. It is most important that the muscles and joints which are in relation with the fractured bone shall be moved voluntarily by the patient as soon as possible after the operation, in order to avoid that stiffness and limitation of movement that so often complicate these fractures. This is especially the case in the joints of the knee, ankle, and foot. In order to obviate this trouble, without risking the security of the junction, the plates which are employed to retain the fragments in position must be as long and as strong as circumstances will permit. They should be secured by as many screws as possible. The plates that are often employed are quite inadequate for the purpose. It is obvious that such early treatment cannot be adopted when the fragments are very fragile and the grip of the plate and screws insecure.

9. That, providing no strain shall be exerted on the junction likely to develop nonunion, the sooner the patient who has been operated on for fracture of one or more long bones of the leg is got up and about, the more bone will be deposited and the more rapid will be the repair at the seat of fracture. For this purpose a good ambulatory splint is a necessity in certain cases.

10. That, should the interval between the fragments be so considerable that union is not likely to take place, even after prolonged congestion, brought about by the use of an ambulatory splint, the fragments should be secured in perfect

alignment by a plate fixed vertically behind the center of the shaft. When this has been done a portion of one of the fragments, which is usually equal in thickness to a third of the total circumference of the shaft, can be sawed and chiseled off and secured over the interval between the fragments, any piece of bone removed to accommodate the graft in the other fragment being fitted to occupy such existing interval as may be left between the bones. If enough material cannot be obtained from the fractured bone to make a graft, it must be got from some other bone.

11. That most of the failures of bone grafting for extensive loss of substance are due to the surgeon depending on the unsatisfactory grip which the graft alone can be made to exert upon the fragments of the shaft. The essence of success depends on the absolute immobilization of the fragments of the shaft on one another, and of the graft upon those fragments. It is obviously ridiculous to attempt to retain the fragments of bone in a useful position by bone grafts alone in these compound fractures produced by projectiles, as it is in any fracture in which the material securing the fragments in position has to bear considerable strain. In grafting bone into gaps in the lower jaw, fixation is supplemented by interdental splints which lock the jaws.

12. That much has been written about wire screws and plates acting as foreign bodies if used in simple fractures, and producing a rarefying osteitis around them. Should such rarefying osteitis exist, it is undeniable evidence that the technic of the operator is faulty and not the procedure. The remedy is in the hands of the surgeon, who must improve his methods. Frequent failures in unskilled hands have led many to attribute their want of success to the employment of steel plates and screws, and to attempt to avoid sepsis by using other and much less effective means.

13. That, while the operative treatment of compound fractures produced by projectiles is the most important of all surgical procedures in warfare, it is, perhaps, well to remember that it may demand a degree of asepsis, mechanical skill, resource, and judgment in excess of that required for other operations for war conditions.

14. That, besides that of sepsis, usually introduced from without, though occasionally developed from a latent infection, hemorrhage is the chief risk which is associated with these operations. This can be best avoided by the use of very powerful hemostatic forceps, which are left in position in the wound for as long as possible during the course of the operation. A ligature is rarely required. It is most important that the wound should be left as dry as possible. When much oozing is expected to follow the operation, a long drainage tube may be left in the wound for twenty-four hours, and so arranged that the extravasated blood may be carried free of the dressings. The removal of the tube does not necessitate any change of dressings, for they are not moistened by the blood.

Local Treatment of Pruritus.

In the second edition of his *Précis de Dermatologie*, Darier devotes particular attention to the local treatment of pruritus. *Lotions* are, as a rule, the more effective the hotter they are used, but some act better when warm or even cold. *Baths* cannot often be tolerated, but the following are sometimes ordered: baths of starch or of bran, with the addition of a liter of vinegar, or containing a kilo of lime-tree flowers; gelatine baths, containing 250 and 500 grams of gelatine, which is first softened in cold water, dissolved by heating and then poured into the bath.

The following are applied by swabbing over the surface: spirits of camphor

(10-percent) or camphor in brandy (1 in 40); camphorated oil of camomile (1 in 20); resorcin, 2- to 5-percent in alcohol; menthol, 1- to 2-percent in alcohol or in liquid paraffin; glycerine of carbolic acid; alcoholic solutions of nitrate of silver (5- to 10-percent); and lemon juice. Of special use are alcoholic solutions of thymol (1 in 200) and of carbolic acid (1-percent), coal-tar emulsion (5 to 10 percent), to which is added from 5 to 10 percent of castor oil or glycerine in order to prevent too rapid drying, and the application is covered with powder. The following solutions, applied by swabbing, are recommended:

- (1) Glycerine. 50 grams
 Vinegar,
 Camphorated spirit,
 Aqua laurocerasi. of each 100 c.c.

For use, this is diluted with from 4 to 10 parts of hot water.

- (2) Cocaine hydrochloride,
 Chloral hydrate,
 Resorcin. of each 1 gram
 Glycerine. 5 grams.
 Alcohol. 20 c.c.
 Aqua laurocerasi. 30 c.c.
 Water. 44 c.c.

Ointments sometimes afford considerable relief. Pure lard, pure vaseline, or a simple salve will sometimes be sufficient; but, as a rule, it is better to use sapolan, naphthalan, or pure cod-liver oil made up into ointment, or preferably in collosol form. With ointments or pastes it is often of great advantage to add antipruriginous substances. Tartaric acid (5-percent) in glycerine of starch, or menthol 1, chloroform 2.5, and camphorated oil of camomile 100. Anesthesine in lanolin cream (10- to 30-percent) with the addition of alcohol or of olive oil (10- to 30-percent).

A useful ointment is composed of:

- Menthol. 1 gram
 Chloral hydrate,
 Camphor (in powder) of each 5 grams
 Lanoline. 35 grams
 Vaseline. 50 grams

If a paste is more suited for application, the following is recommended:

- Menthol. 0.50 gram
 Phenol. 1 gram
 Salicylic acid. 2 grams
 Pumenol. 5 grams
 Lassar's zinc paste. 90 grams

Cod-liver oil ointment:

- Cod-liver oil. 5 to 30 grams
 White oil. 5 to 25 grams
 White wax. 5 grams
 Paraffin. 8 grams
 Aqua rosæ,
 Aqua laurocerasi. of each 10 c.c.

After application to be powdered over with talc.

Sheltering the affected surface from the air is sometimes a most effective method of treatment. Ointments and paste probably act in this way to a great extent. For the purpose zinc pastes are most practicable, being applicable over large extents of surface:

Gelatine,	
Zinc oxide.....	of each 15 grams
Glycerine.	25 grams
Water.....	55 c.c.

The mass is liquefied on waterbath, and applied with a camel's hair brush. A layer of absorbent wool is then applied. Ichthyol and other active bodies may be incorporated, but it is better to apply them over the surface and then to cover up with the paste.—*Jour. de méd. et de chir. prat.*, Aug. 10, 1918.

Sulphur in Psoriasis.

Bory continues to report success in the use of his method of treating psoriasis by injections of sulphur dissolved in sesame oil, at the Dermatologic Center of the Twentieth Region (France). The following is his latest formula:

Precipitated sulphur.....	1 gram
Guaiacol.	5 grams
Camphor.	10 grams
Eucalyptol.	20 grams
Sesame oil to 100 cubic centimeters.	

It has been found advantageous to increase the dosage. The least amount injected is 6 c.c., 10 c.c. is the maximum, and 8 c.c. the usual dose. The febrile reaction is not increased by this augmentation of dose, and the pain, which is an invariable result, is, if anything, diminished. It is noted that patients who take a long walk or who continue at bodily labor do not suffer severely from the reaction.

The first attack on the disease is made by four or five injections at a week's interval between each. The local treatment is commenced with the second injection. This consists of swabbing with coal-tar either daily or on alternate days.—Abstracted from *Journal de médecine*, Sept. 25, 1918.

Other Therapeutic Results of Sulphur Injections.

In the same article are reported some hitherto unrecognized therapeutic actions of sulphur, noted incidentally in the course of the treatment of psoriasis, which may be of some value.

In the first place, an emmenagogue action has occasionally been observed. Secondly, acute cases of orchiepididymitis yield rapidly, the pain and swelling disappearing in two or three days. This action is not due to the constituents of the injection other than the sulphur. Bory in an earlier communication reported an equally favorable effect on gonorrheal rheumatism. The gonococcus is not affected in its vitality by the injections.—Abstracted from *Journal de médecine*, Sept. 25, 1918.

INTERSTATE MEDICAL JOURNAL.

VOL. XXV.

DECEMBER, 1918.

No. 12

EDITORIAL.

THE STANDARDIZATION OF THE WASSERMANN REACTION.

Polemics of an acute character, verging on personalities, have raged and are raging around the question of the true import of a positive or of a negative Wassermann reaction. In these circumstances an article by d'Este Emery, Director of the Laboratories of King's College Hospital,¹ an article which seeks to establish, or at least to lay the foundation for, a standard quantitative method, is highly welcome.

Our author points out that, even after finding a method for quantitative estimation of the degree of the reaction, there still remains the problem of ascertaining what degree of reaction is diagnostic of syphilis. This can be solved only by the systematic application of the quantitative method and by analysis of the results.

While discordant results are obtained, there is a general agreement in the reports of laboratories using professedly the same technic. At first sight, in view of the great complexity of the reacting substances, this seems surprising. It is explained by the fact that most positive results are strong. Thus, if we call the strength of the weakest reaction that can just be certainly detected, 1, reactions of 22, or somewhat more, are not uncommon, while most cases give a reaction not less than 4 on this scale. It is in weak reactions that the cause of discrepancy is found. d'Este Emery's paper purports to describe a method, according to its writer, the only known method for avoiding these discrepancies.

At present the personal equation, using the term in no disparaging sense, must necessarily play a large part in the judgment of a reaction. This arises from the fact that the complement-absorptive capacity of sera varies gradually, and not by steps.

¹d'Este Emery: The Standardization of the Wassermann Reaction (The Lancet, Oct. 26, 1918).

As in all such cases, this introduces a borderland region between the amount of absorptive capacity which is undoubtedly "positive" and that which is equally certainly "negative." The history may help to clear up the interpretative difficulty, but this is, or should be, matter for the clinician.

As long as the laboratory worker is limited to the expressions "positive," "negative," "doubtful," with or without plus signs, so long will the reports differ, even with the same technic. To replace this qualitative nomenclature by a quantitative expression is the first step toward clearing up the difficulty of the complement fixation tests.

So important does the question seem that in Current Notes we are publishing a full abstract of this paper.

MEMORIZING.

(Continued.)

Having satisfied yourself that you have mastered the principle of the artificial correlation of ideas, and having further satisfied yourself that this method insures the rapid, inevitable, and accurate recollection of the one idea immediately on presentation of the other, and that without placing a burden on your memory, you should acquire skill in making correlations. For this purpose collect a large number of words, not directly relating to one another in meaning or in any other way, and, of course, not alphabetically consecutive, and, using these as extremes, make and analyze correlations connecting them, which is the same thing as memorizing them. The reason why it is better to correlate in this way words having no natural connection and having no special meaning for you is that this leads to a pure use of the method. Were you to use, from the beginning, a useful series, you might find yourself bridging some of the gaps with your natural memory, and the result would be that these links would be weak.

As soon as you have acquired facility, you may proceed to the next step, which is that of memorizing a useful series. Of these we have already had a short one. This one was put in early, although doing so was against the principle just enunciated, because it encourages the beginner to find that the method is of practical application. In some of your series, if you make enough of them, and, unless you do, your practice is a waste of time, you are sure to find distant extremes, or other words, between which you will tend to pass without following the prescribed route. This is due to the repetition of some groups of ideas. It is a defect when regarded from the point of view of perfection of the series, but, when one is considering the training of the memory, it furnishes a useful discipline. When we come, as we presently shall, to exercises espe-

cially intended to improve concentration, we shall find, in addition to these short circuits, the opposite defect, a high resistance (low conductivity) between adjacent correlations. This, again, is, from the point of view of the exercises, an advantage.

There are some memory training systems which call on their students to associate in their minds entirely unconnected ideas by repeated visualization of the objects and vocalization of the names, as mill, star; pen, grain. The intention is evidently to exercise three kinds of memory processes (visual, motor, auditory), and to strengthen them by practice. Such an exercise is of some value for training the memory where its normal processes are too one-sided; it corresponds to general gymnastics for a man of sedentary habits. But general gymnastics still leaves you with the transportation and other facilities of the stone age. These are necessary, of course, but it is desirable to supplement them by wheeled transportation and even by the aeroplane. While our method affords ample exercise, it, at the same time, has immense mechanical advantages over the other. It has one disadvantage—you cannot shirk, and get away with it. It is tedious at first, and requires no small amount of courage to go on with, but it supplies you with an instrument as different in speed as the automobile is from Shanks' pony, while being, what automobiles are not, very much more reliable than its natural rival.

The most abstract idea with which we habitually deal is number. Numbers, therefore, are particularly difficult to remember, and particularly useful. We shall also find that the facility for remembering numbers furnishes us with an excellent way of recollecting large masses of other ideas which can be tabulated. In order to remember any numbers without any burden, and yet with certainty, we must convert these abstractions into something concrete with which we can deal. As there are few ideas which can be associated without the assistance of words, it is evident that numbers must be recollected as letters or words.

There are two old conventions with respect to the numerical value of the alphabet—one is of immemorial antiquity and is based on an oriental alphabet. The oldest alphabet still in use which employs this system is the Hebrew alphabet. That the system in question was founded on the Hebrew or on a cognate alphabet is proved by the usage of the Arabs. The order of the Arabic alphabet does not follow that of the Hebrew. The order of the numerical values, as learned by the Arabic-speaking schoolboy, is that of the Hebrew alphabet, familiar to us in the subheading of the 119th Psalm. The one in actual use, however, is of a much more recent origin, although of a quite respectable age. It is phonetic, doubtless because it was originated at a time when spelling was unsettled. For the same reason it ignores the vowels and the letters H, W, Y.

It is given here because the writer is accustomed to it and because it is well known. The student may substitute a convention of his own if he prefers.

- 1=t, d, th (1 has one vertical stroke like t).
- 2=n (2 strokes).
- 3=m (3 strokes).
- 4=r (r is present in the word for "four" in Teutonic, Latin, and Semitic languages, and in Greek, Turkish, and Persian, possibly in other tongues).
- 5=L (as a help, remember L=50).
- 6=sh, ch (soft), j, g (soft), z (in azure), t in tion and similar sounds.
(Persian—shesh=6—often heard when Orientals are playing dominoes or backgammon.)
- 7=c (hard), g (hard), ñ (as in thañk), ng (as in sing), k, q.
- 8=f, v, ph (octave has v).
- 9=b, p (p is like a reversed q).
- 0=ç (sibilant), s, z (pure as in zero).¹

There is an almost endless variety of combinations for the use of these number substitutes. They may be used as the initials of words in a memorized sentence or phrase memorized, not by rote, but by analysis, presently to be explained. Or they may form all the letters of a word or expression, and so almost *ad infinitum*.

At random I open the well-known ABC code, fifth edition. It opens at the word *DRAW*. Opposite this is the number 15728. Suppose that it is necessary for me to memorize this. Well, *draw* (G&S) *overdraw* (C&E) *to lack enough*=15728, the *gh*=f=7. Looking farther down, I see that the sentences under the vocabulary word *DRAW* run to the number 15832. This number may be memorized as *tall foeman*, and this correlated to our first number expression thus: *to lack enough* (M) *hungry* (W&P) *Germans* (G&S) *Prussians* (G&S) *Prussian grenadier* (G&S) *tall foeman*. Analyze these correlations, and you will have no difficulty in recalling, without effort, the numbers in the ABC code, fifth edition, which come under the vocabulary word *DRAW*.

I will not insult the intelligence of my readers by dwelling longer on this explanation. Suffice it to say that this is not an untried fantastic scheme, but one that has been in use for many years, and that has, to my personal knowledge, been the key to advancement for more than one distinguished career. But it is little use if half learned. If mastered, it relieves the mind of the task of remembering abstractions, while leaving it free to develop on the more purely intellectual side. Within the last month it has been necessary for me to memorize a series of unconnected words, numbers, and sentences, amounting to over three thousand "extremes,"

¹Remember to use these symbols as pronounced, not as spelled. Thus, in English, not in Italian, doubled letters are treated as single. Singer=s, ng, r=074, but finger=f, ñ, g, r=8774. Doubt=11.

affording millions of combinations. This, thanks to this system, combined with some of the more advanced methods that I am about to describe, I have been able to accomplish, notwithstanding that I am well past the age when the memorizing of fresh matter, even connected, is easy, and that I am very much occupied with other business.

Concentration Exercises.—These are founded on experience. They are the only empirical part of the system. They consist of word series representing numbers. The numbers may or may not have significance. For exhibition purposes they have significance—otherwise not. As concentration exercises they serve equally well either way, provided there is nothing but number. Thus a list of the states of the Union, with dates of admission and population, is easily memorized by the methods already described. If the correlations were already made for you, you could easily memorize such a list in an hour. But such a list would be of little use as a concentration exercises because of the connection, history, and size of the states being more or less known to you.

Take any pure number series, consisting of not less than 50 numbers of two figures each in a fixed order. Then find words for these numbers which can be correlated directly (without intermediate). The words must be definitely, if feebly, connected. You must make your number series first—not your word series. Analyze carefully the correlations. Learn a few at a time until you have all perfect. You will find short circuits and resistances. So much the better.

When you are word perfect, start mentally reciting the series, translating each word into its number before proceeding to the next word. When you can do this easily, do it *against the watch*. Fifty two-figure series should take from 70 to 80 seconds. If you take longer, *you are not concentrating*. When you recite the series of *numbers* in the right order in 75 seconds, you will find yourself possessed of an entirely new faculty of concentration. You can learn mathematics in a boilershop.¹

(To be continued.)

THE JOURNAL OF ORTHOPAEDIC SURGERY.

The *American Journal of Orthopaedic Surgery*, which is the official organ of the American Orthopaedic Association, announces that with the coming of the new year it will enlarge its scope by serving also as the official organ of the newly formed British Orthopaedic Association. Henceforth the name of the publication will be *The Journal of Orthopaedic Surgery*.

¹Any further explanations or assistance that may be desired will gladly be furnished on request if the latter is accompanied by a stamped "self-addressed" envelope.—Editor, I. M. J.

As this journal has been the only publication in the English language devoted to orthopaedic surgery, and the greatly increased importance of the specialty during the war, it has been felt by the two associations, which count among their members both the Director General of Military Orthopaedics for the United States, Colonel Brackett, and the Inspector of Military Orthopaedics for the British Empire, Major-General Sir Robert Jones, that the best interests of the great mass of mankind now suffering from crippling disabilities will be furthered one step more by such an amalgamation. This closer relationship of all English-speaking orthopaedic surgeons has long been a cherished hope of Lieutenant-Colonel Robert B. Osgood, M. C., U. S. A., to whose enthusiastic efforts the establishment of the *Journal of Orthopaedic Surgery* is largely due.

The journal will be published, as heretofore, by Ernest Gregory, Boston, who assumed the publication in January, 1916, when the journal made its previous step of progress from a quarterly to a monthly publication.

The committees appointed by the British Orthopaedic Association consists of R. C. Elmslie, M.S., F.R.C.S., editor, London; T. R. Armour, F.R.C.S.; W. H. Trethowan, F.R.C.S.; and H. Platt, M.S., F.R.C.S.; while C. F. Painter, M.D., F.A.C.S., and R. W. Lovett, M.D., F.A.C.S., comprise the committee appointed by the American Orthopaedic Association. Miss Hannah Lissner, Boston, has been appointed in charge of the editorial department of the journal in America.

COLLECTIVE ABSTRACTS

FUNCTIONAL METHODS FOR STUDYING DISEASED CONDITIONS OF CERTAIN INTERNAL SECRETORY ORGANS (THE ENDOCRINOPATHIES).

By JACOB ROSENBLOOM, M.D., Ph.D., Pittsburgh, Pa.

(Concluded.)

(g). The Epinephrin Mydriasis Test of Loewi.

Loewi²⁹ found in pancreatectomized animals, in human diabetes, and in cases of hyperthyroidism that the instillation of 1:1,000 solution of epinephrin produced a dilatation of the pupil. He proposed this procedure as a test for hyperthyroidism, and claimed that the internal secretion of the thyroid and suprarenal are synergistic, both acting by stimulating the sympathetic nervous system; therefore, in cases of hyperthyroidism the sympathetic system is in a state of increased irritability and the dilator fibers of the iris governed by the sympathetic respond abnormally to the action of epinephrin. Falta³⁷ and Zak³⁸ have corroborated this finding. Eppinger, Falta, and Rudinger³⁹ found an increased epinephrin mydriasis in dogs fed on thyroid, and Eppinger and Hess⁴⁰ reported the test positive in cases of hyperthyroidism.

(h). The Skin Reaction of Goetsch for Hyperthyroidism.

In this test 8 minims of a 1:1,000 solution of epinephrin are diluted with an equal quantity of sterile water and injected hypodermically into the arm. There is formed at once an area of blanching around the point of injection, and about the margin of this usually a red areola gradually shading off into the surrounding tissue. In about half an hour the center of the white area becomes bluish-gray to lavender, and at the end of about a half hour to two hours the red areola takes on the bluish or lavender color, while that in the center disappears. This lavender areola remains for about four hours from the time of injection and is the most characteristic part of the test. Accompanying the local reaction there may be an increase in pulse rate, with palpitation of the heart and an exaggeration of the tremor and nervous symptoms in general.

II. HYPOTHYROIDISM TESTS.

Therapeutic Test for Hypothyroidism.

The diagnosis of a state of hypothyroidism is easy in typical cases, but the latent cases present a more difficult problem. The therapeutic test at present is the only one available and consists in the administration of thyroid extract. It is best carried out by giving tablets of desiccated thyroid gland, containing 1½ to 5 grains of the gland. The dose is given three times a day and gradually increasing, care being taken not to produce tachycardia, sweating, diarrhea, or nervousness, which are signs of intolerance. If the case is one

of hypothyroidism, the symptoms will disappear or show improvement in about two weeks.

III. METHODS FOR STUDYING THE FUNCTION OF THE PITUITARY GLAND.

Test for Hyperpituitarism by Means of the Increased Gas Exchanges.

The respiratory exchanges in cases of acromegaly has been studied by Magnus-Levy, Salomon, Bernstein, and Falta. Falta claims that the cases so far studied do not show a consistent increase in gas exchanges in acromegaly as in the case in hyperthyroidism. Magnus-Levy, Salomon, and Falta all agree that, if the hyperpituitarism is uncomplicated by disorder of other glands of internal secretion (as thyroid), there is no increase in the gas exchanges.

Spontaneous and Alimentary Glycosuria as a Test for Hyperpituitarism.^{41 42 43}

Marie, who first described that condition of hyperpituitarism called acromegaly, showed that it is often accompanied by temporary or permanent glycosuria. Borchard, in an analysis of 176 cases, found spontaneous glycosuria reported in 63 and alimentary glycosuria in 8. In Falta's 8 cases there was spontaneous or alimentary glycosuria in 5.

The tests for provocative alimentary glycosuria are four in number: (1) the sucrose test, (2) the glucose test, (3) the levulose test, and (4) the galactose test. The glucose test has been most frequently used in testing the tolerance for carbohydrates in cases of suspected hyperpituitarism.

1. THE SUCROSE TEST.

One hundred and fifty to 200 grams of cane sugar syrup are given to the subject in the morning while fasting. The urine is collected every hour and tested for reduction by means of Fehling's or Benedict's solution. A reduction makes the test positive.

2. THE GLUCOSE TEST.

The patient takes in the morning before breakfast, on an empty stomach, 150 grams of pure dextrin-free glucose dissolved in 300 c.c. of water. One can allow fifteen minutes in which to drink this solution. The urine is collected every hour for ten hours and each specimen tested for sugar. The patient stays on a milk diet during this time. The presence of glucose in the urine renders the test positive if it is known that the patient does not present a condition of spontaneous glycosuria.

3. THE LEVULOSE TEST.

One hundred grams of levulose are given in the morning on an empty stomach and the urine examined every two hours for the presence of sugar. A reduction shows presence of lessened ability to use this sugar.

4. THE GALACTOSE TEST.

Thirty grams of galactose are given to the patient in the morning on an empty stomach and the urine collected every two hours for six hours. The presence or absence of galactose in the urine is determined by Fehling's or Benedict's solution.

HYPOPITUITARISM.

Functional Diagnosis of Hypopituitarism.

In the functional diagnosis of hypopituitarism the opposite condition in relation to gas exchanges and glycosuria obtain as compared to hyperpituitarism. In hypopituitarism the same tests are applied as for hyperpituitarism. The results are the opposite—i. e., the gas exchanges will be diminished, and glycosuria, spontaneous and alimentary, will be negative.

IV. TESTS FOR ADRENAL FUNCTION.

The Ehrmann-Meltzer Reaction as a Test for Hyperadrenalism.

Meltzer and Auer,⁴⁴ Wessely,⁴⁵ and others found that, when epinephrin is applied to the frog's eye, dilatation of the pupil is produced. Ehrmann⁴⁶ suggested this reaction as a test for epinephrin. He found it acted upon the dilator fibers of the iris in a strength of 1 to 20,000,000. Recent investigations have shown that substances other than epinephrin contained in blood serum will produce the same reaction, and thereby the reliability of this test has been questioned.

The Deviation of Complement as Applied to Diagnosis of Hyperadrenalism.

The complement fixation test has been applied by Polito and Corelli⁴⁷ to the diagnosis of hyperfunction of the suprarenal glands, using an alcoholic extract of the suprarenal gland as an antigen. Their results were not conclusive.

The Epinephrin Glycosuria Test for Hyperadrenalism.⁴⁸

In cases of hyperadrenalism the subcutaneous injection of 1 or 2 milligrams of epinephrin is followed in half an hour to two hours by a glycosuria lasting three hours and accompanied by a hyperglycemia. For the estimation of the blood sugar any one of the following three methods may be used.

1. Micro Method of Bang for Estimation of Sugar in Blood.

PRINCIPLE.—Two or 3 drops of blood are transferred to a small weighed piece of blotting paper and the paper again weighed to determine the amount of blood. The paper is then treated with boiling acidified KCl solution, which coagulates the protein and allows the sugar to diffuse out. The sugar solution thus obtained is boiled with alkaline cupric chloride solution. The amount of cuprous chloride formed by the reducing action of the sugar is determined by titration with standard iodine solution.

PROCEDURE.—Small pieces of good absorbent paper, about 16 x 28 mm. in size,¹ weighing about 100 mg. and held by a small spring clip, are used. To one of these previously weighed² transfer 2 to 3 drops (about 120 mg.) of blood obtained by piercing the cleansed finger. Weigh again immediately and determine by subtraction the weight of the blood taken.

Coagulation of Blood Protein.—Transfer the piece of paper to a test-tube

¹Suitable pieces of paper, weighed, ready for use, and with clip attached, may be obtained from Griffin and Sons, London, or Grave of Stockholm. Unless specially prepared, the paper should be repeatedly washed with large volumes of hot water, acidified with acetic acid to remove impurities.

²The weighing is preferably made on a special torsion microbalance, which, as well as the other apparatus used in this method, may be obtained from either of the firms mentioned in note 1. The weighing must be made in a few seconds and with an accuracy of about 1 mg.

and add 6.5 c.c. of boiling acid potassium chloride solution¹ and let stand half an hour. The clear solution containing the sugar is poured into a 50-c.c. resistance flask, the flange of which has been removed. Wash the paper and tube again with 6.5 c.c. of hot salt solution and transfer washings to the flask. Cool.

Reduction of Cupric Chloride.—Attach to the mouth of the flask a piece of tight-fitting rubber tubing about 2 inches long, provided with a clamp which permits of shutting off the contents of the flask from the outside air. Now add to the flask 1 c.c. of the cupric chloride solution.² Heat so that the solution is brought to a boil in one minute and thirty seconds (an error of five seconds may be disregarded). Allow to boil for exactly two minutes; at the end of this time tighten the clamp over the mouth of the flask. At the same time remove from the flame and cool at once under the tap for about a minute.

Titration of Cuprous Chloride Formed.—The titration is made with N/200 iodine solution³ run in from a very accurate burette (preferably a 2-c.c. burette graduated in 1/50 c.c.). Two or 3 drops of starch solution (preferably soluble starch⁴) are added as an indicator. During the titration air must be excluded to prevent reoxidation. This is done by running a slow stream of carbon dioxide from a generating bottle through a small tube which extends nearly to the bottom of the flask. The titration should be carried out against a white background and the end point taken when the blue color persists for twenty to thirty seconds.

Calculation.—The copper and other solutions used in the test bind about 0.12 c.c. of the iodine solution. This amount must hence be subtracted from the reading. The corrected reading is then divided by 4 to obtain the number of milligrams of glucose in the sample.

Example.—If 0.68 c.c. of N/200 I solution were required, $\frac{0.68-0.12}{4} = 0.14$ mg. glucose in the amount of blood used. If 140 mg. of blood were taken for analysis, the percent of glucose in the blood would be $\frac{1000 \times 0.14 \text{ mg.}}{140} = 0.1$ percent glucose.

The results obtained by this method are a little higher than those obtained by other reliable methods, due to the presence of certain I-binding substances in blood. As these appear to be nearly constant in amount, a correction may be applied. To obtain true value for glucose of the blood, therefore subtract 0.015 percent from the value obtained as above. 0.1 percent — 0.015 percent = 0.085 percent glucose.

To secure accurate results, the method of Bang must be rigidly controlled, all new solutions and absorbent papers being checked up against pure 0.2 percent glucose solutions. Taylor and Hulton⁴⁹ also suggest the following precautions: A blank check must be made on the reagents each day an estimation is made; 0.010-0.15 gram of blood should be taken and must spread smoothly on the paper. The proteins are best coagulated by heating of the blood-impregnated papers in the hot-air oven at 100° (as recommended by

¹The acid potassium chloride solution consists of 1,360 c.c. of saturated KCl, to which is added 640 c.c. of water and 1.5 c.c. of 25-percent HCl.

²Copper solution. Introduce into a 1,000-c.c. flask 700 c.c. of boiled and cooled water. Warm to about 30° C. and add 160 grams of pure potassium bicarbonate in powder form. When dissolved, add 66 grams of pure KCl. Cool and then add 100 grams potassium carbonate. Finally add 100 c.c. of 4.4-percent solution of pure crystalline copper sulphate. Let stand a short time and then make to mark with boiled water. Allow to stand a day or two before using.

³N/200 I solution, made fresh each day. Dilute N/10 I solution 20 times, or make as follows: Introduce into a 100-c.c. flask 2 grams KI, 1-2 c.c. of 2-percent KIO₃ solution and 5 c.c. of N/10 HCl. Make to mark with boiled and cooled distilled water.

⁴A 1-percent solution of soluble starch in a saturated KCl solution.

Gardner and McLean)⁵⁰ for five minutes, with corks of flasks inverted. The solution should be boiled four minutes for complete reduction. The iodine solution must be fresh each day and checked each day. Determinations should be made in triplicate. Results cannot be depended on to be more accurate than to 0.005 gram glucose in 100 c.c. blood. Other authors have recommended that an hour instead of half an hour be allowed for the diffusion of the blood sugar, the fluid being brought to the boiling point twice during this period or kept in a bath at 40° C.

2. Lewis-Benedict Method⁵¹ of Estimation of Sugar in the Blood.

Principle.—The red color obtained by heating a glucose solution with picric acid and sodium carbonate is employed as the basis of the colorimetric determination. The blood protein is removed by precipitation with picric acid.

Procedure.—Two c.c. of blood are aspirated through a hypodermic needle^{52 1} and a piece of rubber tubing into an Ostwald pipette, a little powdered potassium oxalate in the tip of the pipette preventing clotting. The blood is drawn up a little above the mark and the end of the pipette is closed with the finger. After the rubber tubing and needle are disconnected, the blood is allowed to flow back to the mark and is discharged at once into a 25-c.c. volumetric flask containing 5 c.c. of water. The contents of the flask are shaken to insure thorough mixing and the consequent hemolysis of the blood. Then 15 c.c. of saturated aqueous solution of picric acid are added, as well as 1 or 2 drops of alcohol to dispel any foam, and the contents of the flask are made up to the mark with water and then shaken. After filtration, 8 c.c. aliquots are measured out into large Jena test-tubes for duplicate determinations. Two c.c. of saturated picric acid and exactly 1 c.c. of 10-percent sodium carbonate are added (as well as two glass beads and 2 or 3 drops of mineral oil), and the contents of the tube are evaporated rapidly over a direct flame until precipitation occurs. About 3 c.c. of water are added, the tube is again heated to boiling to dissolve the precipitate, the contents of the tube are transferred quantitatively to a 10-c.c. volumetric flask,² cooled, made up to the mark, shaken, and then filtered through cotton into the chamber of a Dubosq colorimeter. The color is compared at once with that obtained from 0.64 mg. of glucose, 5 c.c. of saturated picric acid, and 1 c.c. of 19-percent sodium carbonate, when evaporated to precipitation over a free flame and diluted to 10 c.c. as was the unknown, or against the picramic acid standard.³

Calculation.—If directions are followed exactly, the calculation is as follows:

$$\text{Milligrams glucose is unknown} = \frac{\text{reading of standard} \times \text{milligrams of reading of unknown}}{\text{reading of unknown}}$$

glucose in standard.

*Pearce's Modification of Lewis-Benedict Method.*⁵³—This modification entails

¹It may be more convenient to draw about 5 c.c. of blood directly into a test-tube containing a little finely powdered potassium oxalate and removing 2 c.c. portions of this with the Ostwald pipette.

²In case of hyperglycemia the final volume of the reaction fluid is made 25 c.c. or 50 c.c., and the results are accordingly multiplied by 2.5 or 5.0.

³Permanent Standard.—A solution of picramic acid makes a very satisfactory permanent standard. The color is identical in quality with that formed in the method above and its solution keeps perfectly. The formula of the permanent standard is:

Picramic acid.....	0.064 gram.
Sodium carbonate (anhydrous).....	0.100 gram.
Water to make.....	1,000.0 c.c.

Dissolve the picramic acid with the aid of heat in 25 to 50 c.c. of distilled water which has been made alkaline with sodium carbonate. Cool and dilute to 1 liter. This solution has the same intensity of color as that obtained by the proposed method with 0.64 mg. of sugar when the final volume of the reaction fluid is made 10 c.c.. The solution should be standardized against pure glucose.

A satisfactory preparation of picramic acid may be obtained from the J. T. Baker Chemical Company, Phillipsburg, N. J.

the use of an autoclave instead of the free flame, and has the advantages of decreasing danger of loss and making it possible to carry out a large number of estimations at one time. Proceed exactly as in the Lewis-Benedict, but use 6 c.c. of the picric acid filtrate instead of 8 c.c., and instead of heating over the free flame introduce into an autoclave for fifteen to thirty minutes at about twenty pounds pressure to the square inch. Compare with standard in a colorimeter. The standard recommended by Lewis and Benedict may be diluted one-fourth or allowed for by calculation, since 6 c.c. of filtrate are used in place of 8 c.c.

3. Epstein Method of Estimation of Sugar in the Blood.

Principle.—This method⁵⁴ is a modification of the Lewis and Benedict procedure, being based on the same principle, but making possible the determination of reducing sugar in finger blood (0.1-0.2 c.c.) with a sufficient degree of accuracy for clinical purposes, and with little expenditure of time. Instead of a Duboscq colorimeter, the less expensive Sahli-Gower hemoglobin colorimeter is recommended.

Procedure.—The apparatus¹ and the following reagents are necessary:

1. Picric acid, saturated solution.
2. Sodium carbonate, 10-percent solution.
3. Sodium fluoride or potassium oxalate, 2-percent solution.

Put 1 or 2 drops of the fluoride or oxalate solution into the graduated test-tube. By means of the blood pipette, 0.2 c.c. of blood is obtained from the tip of the finger or the lobe of the ear, and is discharged into the tube containing the fluoride solution. The pipette is rinsed two or three times with distilled water and the washings added to the blood in the tube. Distilled water is then added to the 1.0 c.c. mark. After laking of the blood has taken place, picric acid is added to this (a few drops at a time) up to the 2.5 c.c. mark, shaking the tube gently with each addition of the acid. Precipitation of the blood proteins takes place; the sugar, together with an excess of picric acid sufficient for the reaction, stays in solution. The tube is finally shaken vigorously (covering the end of the tube with the finger) and the contents filtered through a small filter, or, better still, centrifuged for one or two minutes.

One c.c. of the filtrate or the clear supernatant fluid obtained on centrifugalization is withdrawn, put into the plain test-tube, and heated carefully over the naked flame. The contents of the tube are boiled until all but 2 or 3 drops of the solution are evaporated. One-half c.c. of the 10-percent sodium carbonate solution is then added and the tube heated again until the contents are concentrated to a small volume equal to about 2 or 3 drops. The color of the fluid changes from yellow to deep red or reddish brown and the reaction is completed.

Three or 4 drops of distilled water are added and the tube warmed gently. The contents are then transferred to the graduated tube of the hemoglobinometer. The boiling tube is rinsed several times with water (using only 3 or 4 drops at a time). The tube is armed with each rinsing before transferring

¹The tubes belonging to this hemoglobinometer are not all equally calibrated. With some the 50 percent mark represents a volume of 1.0 c.c.; with others, 1.0 c.c. of fluid reaches up to the 43, 45, 46, or 47 percent mark. The error in the calibration is generally below the 10 percent mark; the graduations above this mark are usually correct. By means of the standard 1.0-c.c. pipette one can readily determine whether a given tube is properly calibrated. In order to facilitate a direct reading of the percentage of sugar on these hemoglobinometer tubes, it is essential to have 1.0 c.c. of fluid stand at mark 50. To overcome a discrepancy (if any exists) in the calibration of a given tube, one may put one, two, or three small glass beads in the bottom of the tube, of such size as to raise the meniscus of 1.0 c.c. of fluid up to the 50 percent mark.

the contents to the graduated tube. The volume of fluid is then made up to the mark 50 on the scale.

The color of the resulting solution is compared with that of the two standard tubes, A and B, which accompany the instrument. If it is darker than standard A (representing 0.05 percent of sugar) and lighter than standard B (representing 0.1 percent), the first standard is used for comparison. In either case the solution in the graduated tube is diluted gradually with water (just as is usually done in hemoglobin estimations) until the colors match.

The percentage of the sugar in the blood is then computed thus: Using the lighter standard A, the figure on the scale, divided by 1,000, represents the percentage of sugar in the blood. For example, the tube reads 86; then the result is $\frac{86}{1000} = 0.086$ percent.

When standard B is used for comparison, the figure on the scale is multiplied by 2 and divided by 1000. For example, the tube reads 73; then the percentage of sugar is $\frac{73 \times 2}{1000} = 0.146$ percent.

With the instructions given, the above formulas may be used for direct computation of the percentage of sugar only when 0.2 c.c. of blood is used in the determination. When, however, only 0.1 c.c. of blood is used, the formulas apply as well, but the value obtained must be multiplied by 2.

It is better, in cases in which a high sugar content in the blood is suspected (in diabetes, for example) to use only 0.1 c.c. of blood for the determination. In all other cases 0.2 c.c. of blood should be used.

II. HYPOADRENALISM TESTS.

(a). **Sergent's White Adrenal Line as a Test for Adrenal Insufficiency or Hypoadrenalism.**

Emil Sergent⁵⁵ has described this vasomotor phenomena as a test of adrenal insufficiency. He selects the skin of the abdomen and on it is traced a geometrical figure—a rectangle, triangle, or cross—this doing away with possible confusion with lines caused by folds of the skin, etc. The rounded end of a fountain pen is a good instrument for tracing the figure. The figure should be made by a simple superficial stroking; one must not bear down or scratch the abdomen. The motion should be deliberate and not rapid. He claims that a too early appearance of an outline is always a sign of clumsiness, as such treatment strikes and suppresses the vasomotors, thus interfering with the reaction.

When the tracing has been made, all movement on the part of the patient is prohibited. After half a minute a pale line or band begins to be noticed following the course of the pen. Gradually this becomes more and more distinct and white, at the same time becoming larger, so that eventually the line exceeds in size the actual area touched by the pen. This white line attains its maximum clearness in the course of about one minute, and persists for one, two, or even three minutes before being gradually obliterated. This constitutes the reaction in well-defined cases of adrenal insufficiency. He finds the lighting plays an important part in the technic, as in bright daylight or sunlight, or even in bright electric light, it is sometimes difficult to see the white line. For this reason, after making the tracing, draw the sheet or clothing in such a way as to cast a light shadow. On account of the influence of the presence of clothing and such before making the test, the patient should be put at rest for at least fifteen minutes, with the abdomen free and but lightly covered.

Sergent considers his so-called "ligne blanche surrenale" as due to the hypotension brought about by the hypoadrenia. It is known that in arterial hypo-

tension there is present a peripheral vasodilatation produced by a slight stimulation of the skin. Vasoconstriction replaces the vasodilatation with the resulting white line.

(b). Test for Hypoadrenal Function by Means of Increased Sugar Tolerance.

It was shown by Eppinger, Falta, and Rudinger⁵⁶ that cases of Addison's disease (hypoadrenalism) had an increased tolerance for sugar. Polak⁵⁷ found that 2 mg. doses of epinephrin did not produce glycosuria in a case of Addison's disease, while it did so in normal persons. On these findings this method for determining the presence of hypoadrenalism has been developed.

The methods for determining the sugar tolerance have been previously described.

V. TESTS FOR INTERNAL SECRETORY FUNCTION OF THE PANCREAS.

(a). Cammidge Reaction.^{58 59 60}

Technic of the Cammidge Test.—Filter a portion of a 24-hour specimen of urine.

Test for Protein.—If protein is present in amount more than a trace, measure out 50 c.c. of filtrate and add a few drops of acetic acid, boil, cool, filter, and make up to 50 c.c.

Test for Sugar.—Either Fehling's or Nylander's test is performed. The result must be absolutely negative. If there is any reduction on standing, about 50 c.c. of the protein-free urine must be mixed with yeast and fermented for twelve to twenty-four hours and filtered.

Stage 1. Measure 20 c.c. of the clear protein and sugar-free filtrate into a small flask with an inverted filter funnel placed in its mouth as a condenser. Add 1 c.c. of strong HCl. Boil on sand bath for ten minutes from commencement of ebullition. The boiling should not be too vigorous and the flame should be turned low for the greater part of the time.

Stage 2. Cool under the tap. Make up contents to 20 c.c. with distilled water. Slowly add 4 gms. of lead carbonate; shake gently at first and more thoroughly later. Stand, and shake occasionally until no more gas comes off. Filter through a paper moistened with distilled water.

Stage 3. Add 4 gms. of powdered tribasic lead acetate. Shake thoroughly for some minutes and allow to stand. Filter through moistened filter paper.

Stage 4. To the clear and almost colorless filtrate add 2 gms. of powdered sodium sulphate, shake thoroughly for several minutes. Bring slowly up to the boiling point on a sand bath, shaking from time to time. The excess of lead is removed at this stage, and it is important that the shaking and heating should be done carefully.

Stage 5. Cool under the tap and filter. Measure 10 c.c. of clear filtrate. Make up to 18 c.c. with distilled water. Add 8 gms. of phenylhydrazine hydrochlorate, 2 gms. powdered sodium acetate, and 1 c.c. of 50-percent acetic acid.

Boil in a flask with a funnel condenser on the sand bath for ten minutes from the commencement of ebullition. Do not boil too vigorously. Filter hot through a filter paper moistened with boiling distilled water into a 15-c.c. measure. Should the filtrate fail to reach the 15-c.c. mark, make up to 15 c.c. with hot distilled water. Stand for from four to five hours or longer at room temperature or in ice chest.

Examine the filtrate for the appearance, solubility, and amount of crystal

formation. The typical crystals examined under the microscope are of the osazone type, and more circular and tuft-like than the glucosazone crystals. Run under the cover slip 33 percent H_2SO_4 ; the crystals should dissolve in ten to fifteen seconds. The crystals have to be distinguished from the coarse yellow needles which may be deposited if the excess of lead was not removed in stage 4. In a strongly positive reaction the deposit of crystals may occupy half the bulk of the filtrate. In a completely negative reaction the filtrate remains clear.

(b). Loewi⁶¹ Test for Internal Pancreatic Function.

This test consists in dropping into the conjunctival sac a few drops of a 1:1,000 solution of epinephrin. In the absence of hyperthyroidism, dilatation of the pupil points to the presence of an internal pancreatic insufficiency. This test is based on the fact that in normal persons the instillation of epinephrin into the eye does not cause a dilatation of the pupil, while the intravenous injection does. This dilatation following the local application of epinephrin is thought to be due to the increased excitability of the sympathetic system owing to the absence of the inhibitory effect of the pancreatic internal secretion.

(c). Test for a Spontaneous and Provocative Alimentary Glycosuria as Indicating the Internal Pancreatic Function.

These tests are carried out in the manner as previously described. It may be assumed that the presence of glycosuria after these tests indicates either hepatic or pancreatic insufficiency or both.

VI. THE PARATHYROID, PINEAL, THYMUS, AND GONADS (OVARY AND TESTES).

As yet there is no method known of experimentally estimating the functional activity of the parathyroid, pineal, thymus, or gonad glands.

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Jenkins Arcade.

ORIGINAL ARTICLES.

OUTLINE OF RECONSTRUCTIVE THERAPEUTICS.

Suggestions for Studies in and Teaching of Accessory or Supplemental Remediation, Designed for Physicians and Training of Expert Aides for the Army and Navy.

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The profession and the public are coming to realize that much more is needed in a full system of therapeutics than those ordinarily employed. Man is a biomechanism as well as a congeries of biochemisms, enzymes, ferments, secretions, and nutrient fluids.

In branches accessory or supplemental to medicine the surgeons-general of the army and navy have announced their needs for several thousand to act as reconstruction experts, especially aides to assist military surgeons in the rehabilitation of war cripples for the purpose of adapting the men to vocational occupations and for private activities. Instruction is needed as much for graduates in medicine as for laymen whom they will direct and instruct.

These courses are being supplied in most large centers. They should be considered from not only the standpoint of technical adequacy, but ideal aims and purposes. The offerings here made are hints from the experience of one who has devoted a lifetime to reconstruction in civilian practice.

The immediate objectives are to furnish exceptionally good lay experts for repairing men disabled by battle wounds, injuries, or other disablements, as from shock, exhaustion, bewilderments, disease effects; to return men to service when possible, but particularly to fit them for engaging in any civilian vocation or enterprise—domestic, or industrial, or professional. These experts are by no means limited to meeting the immediate exigencies created by war, but are designed for the much broader field of usefulness opened up in the diversified demands of society and communal responsibilities. Since there will be needed not only the best obtainable experts at once and for future use, it is desirable to formulate ideals and standards for comparison and revision.

In short, the skill thus attained should prove of peculiar value

to physicians as well as others, and will be appreciated and welcomed in proportion as the students or neophytes realize their possibilities for good and devote their best energies to attaining the highest qualifications of which each one is capable.

Already a notable awakening and recognition has been shown by the profession and public in demands for advancements in rehabilitative and in reconstructive personal hygiene as agencies for supplementing advances in medical practice, in social welfare work, and the art of human conservation on the higher planes.

The war has brought about a recognition for the first time in the history of the world of the value of expertness in reconstruction on a parity with many departments strictly medical. The one is incomplete without the other. Whether this interest shall continue and amplify depends on the intelligence, zeal, and conscientiousness of the individual worker in the new and enlarging domain of accessory or supplemental medicine.

It should be of interest for any candidate, professional or lay, to know that such a course will put him or her in line of progress to become a more valuable adjunct in any and every department of human remediation and of individual and communal (social service) welfare. They will not only become especially able to render service now to soldiers and sailors who have jeopardized their limbs, eyes, ears, and other physical equipment, parts and attributes mental and moral, but will be in a position to render yet larger and increasing service to mankind in the future. Not only so, but the character of such training is adapted to greatly improve their own personal physical and mental powers, capacities, attainments, and proficiencies.

The special training qualifies them in accurate movements, muscular coordinations, in correct, economic attitudes and postures, and will make them proficient in that greatest of accomplishments—conscious control of body and mind as a unit.

I. GENERAL MEASURES TO BE PURSUED.

After the wounded, injured, or diseased man has had the full benefits which the military surgeon has time or opportunity to confer, there yet remain directions and degrees of disability, grades of decrepitude which unfit him for immediately resuming his former or undertaking any new occupation. Some disabilities are irreparable; others remediable. There is, first of all, the man's mental attitude toward the episodes endured; his conception of his personal limitations (central or psychogenic factors), in addition to the physical limitations, crippling—in short, the damaged motor mechanisms (structural or peripheral). Mental shock must be overcome, reconciled, adjusted, explained away.

Special expert guidance is required to enable him to meet his

changed conditions, his outlook on life, along with training, explanation, reassurance, likewise particularized adaptations in two chief domains: in psychotherapeutics, by psychoregulation—i. e., reconciling the reactions of the creature to a new group of environmental factors, a reawakening and reeducation of earlier mental and physical protective reactions (automatisms), and such as shall meet newly created environmental conditions; and, second, the physical limitations, among which are loss of a part, of a sense organ—e. g., a limb, eye, etc.; disrepair of a part, an original function, or aptitude, such as impairment of a bone, of a joint, of muscle bundles, etc., adhesions, contractures, etc., disarrangements of structures due to interruptions between motor center and outlying part; also secondary effects due to shock, among which are tremor, spasm, contractures, impairment of sensation, loss of power, circulatory imbalance, etc., due to an admixture of psychogenic and physico-genic inhibitions.

There will be obvious need here for using orthopedic measures, not surgical in character, but employment of the same principles of adjustment and readjustment common to psychoregulation, psychodiagnosis, psychotherapy, etc. Also there is the problem of the inevitable—the invariably occurring self-deceptions, misconceptions, the psychopathies, the bewilderments, fears, anxieties, depressions, due to disturbed points of view, changed outlook on life, the urgent need for getting on in the world, and for social, domestic, and other readjustments.

Here is a grave situation, deserving of the utmost solicitude, study, and tenderest care, one which seems the province of those whose training has been lifelong among neuropathic and psychopathic sufferers. Lay assistants can be trained to render varied forms of service suitable to each case, provided they are intelligently supervised and directed. Mistakes must be avoided, however, by vigilance; otherwise distressing results, permanent invalidism, hypochondriasis, obsession, will follow.

Also there are the almost equally absorbing problems based on psychomotor or kinesthetic, or orthobiotic, or physiodynamic disarrangements, the crippings, the impairments in mechanisms from center to remotest part. Expert care is required in the rehabilitative and coordinative possibilities by adaptations, compensations—in short, problems of special proficiency. Experience teaches that by wisely applied developmental measures it is quite possible to so raise the efficiency or proficiency coefficient as to produce an enhancement of powers over and above previous status. The war cripple “passes through divers varieties of bitter experiences,” which in the final count may redound to his advantage in many directions.

In order to meet these conditions, to solve the clinical and also

the economic problems, it is essential to approach them from the standpoint of form, mass, motion, gravity, ponderability, and the like elements (biophysics), to learn to think in terms of vitalized mechanics. All this involves experience in remediation by manipulation, by developmental measures which will be more clearly outlined and described.

There is demanded in the reconstructor a special aptitude, a type of psychogenic helpfulness, a deftness, in which kinesthesia, the muscle sense, tactile apperception, motor accuracy, tactile proficiency, all must be supplied. He must likewise act as guide in training other assistants.

During episodes of reconstruction the point of departure, the crisis, is often reached in the lives of these heroes, trending either toward usefulness and happiness or away from active life to non-productive invalidism. Whether they shall become thereafter valuable members of the community, enriched by their experiences, or discouraged, dependent, shut-in personalities, either a constant distress to their families and friends or a burden on the community, a drain on the resources of the nation, depends on how they shall be now safeguarded and handled. A point of prime importance in the solution of obscure conditions, obdurate resistances to rational remedies, is the existence of previous abnormal states not recognized or at the time quiescent. For example, peculiar pains, nervous disturbances (psychic anomalies), oversusceptibilities, etc., may often be readily explained by dead teeth, nonsensory root abscesses, dental exostoses, diseased tonsils or antra, or other focalized sources of septic irritation.

It may happen that little trouble would have arisen from any one of these focal irritations unless some upset, some shock, occurred to disturb psychophysical equipoise. Of course, in war the man material thus disorganized by injury (trauma) is wholly unlike that in average civilian experience. The soldier is one of a selected group, individually sound, in trained condition at the onset of injury. Not only is he the unit of a highly elaborated group, but there should have been sedulously weeded out dubious units, the unstable, the feebly inhibited, the constitutionally inferior, the queer or "odd fish" (aberrant aments). Of course, some social inefficients do creep in.

Mankind in these United States is a complex blend of many unlike (antithetic) races recently fused; the salient characteristics of one or other dubious strain (devolutes) are liable to come to the surface under injury or sickness—and those proverbially not the best ones. Courage, fortitude, cheerfulness, and many admirable attributes are common properties of our people. But docility, patience, equanimity, and that unconquerable determination which

bridges over the seemingly insurmountable cannot always be counted on—even in this group of picked men.

Among the injuries which tend to disable, to cripple, to impair industrial efficiency are: Amputation—here the part is gone; there may be remnants of available bones, muscles, fibrous attachments, joints which can be brought into the field of motor efficiency, or on which to attach substitutes; apparatus, simulations of limbs, fingers, etc. (prosthesis). Bone injuries, badly united or ununited fractures, conditions of chronic osteomyelitis due to dead bone (sequestra), or foreign bodies imbedded in the bone; loss of mineral constituents—e. g., lime (decalcification), also functional paralysis due to long fixation, as on a splint (immobilization); this may involve the backbone, hence impairing the mobility of the lateral nerve outlets (rami). Joint injuries, immobilities or impaired mobilities, also contractures caused by protracted fixation or damage to adjacent structures, joints, to bony ankylosis, due to obstructions, or painful states in joints, the result of inequalities in the articular surfaces, foreign bodies or infection, or other effects of disease, of cold, of damp, of disordered nutrition. Nerve injuries, either complete division of a nerve or nerves in continuity, or nerve terminals imbedded in scar tissue, paralysis. Torpidity of cortical, spinal, and kinesthetic centers, a part thus passing from the consciousness of the patient. Tendon and muscle injuries, ununited divisions of fibrous coverings of muscles or muscle-masses, loss of muscle fibers by supuration, atrophies, deformations of any or all causations or varieties, contractures, scar tissue bindings. Paralysis, partial or complete, may ensue, capable of being much relieved by simple rational measures; effects of penetrating wounds, of bullet or other missile passages, shrapnel bits, with loss of structure, atrophies, etc. Stumps must undergo preliminary treatment, to be hardened and otherwise brought to a condition for training and for prosthetic attachments. Personal effort must be stimulated, so also must ambition, interest be aroused, by cordial, intelligent urgings. Wounds of the lung are peculiarly important, now vastly better treated, but still needing judicious after-care.

The prime consideration in recovery of temporary tone is to favor the nutritive balance of the cell. This is the key to enhancing the powers of resistance, in fortifying immunity. Time and rest are the great healers until the parts are ready to resume action. Even on the battlefield, "safe conduct of the injured" is ample time to recover from shock a few hours, a day or two, wherever possible in order to regain equilibrium in cells, in nervous and spiritual equipoise, in mental easement. Rest is the great pain compensator. Pain unrelieved is the great destroyer. After-injury (posttraumatic) pains, distresses, loss of sensation (anesthesia), tonic spasm,

are of utmost importance and require constant study. New points can be learned almost every day.

Immediately after injury the essentials are, among others, safety from further harm, a dry dressing, some fluid food, hot or cold as desired, and ease of posture (attitude), with the head lower than the body till the blood pressure becomes equalized. Vaso-motor equilibrium (balance in the opening and closing of the blood vessels) is of vast significance, and especially where, as is usually the case, some degree of shock exists or persists. Thereupon heat, hot bottles, and often hot dressings, are of paramount value as preparatory for further measures and preventives of infection. So is heat of value in the torpidities of after-effects, even diathermia to awaken joints, or dry heat by Tyrnauer's cabinet.

II. ORTHOPEDIC PRINCIPLES AS A BASIS OF TREATMENT FOR MANY SO-CALLED MEDICAL PROBLEMS.

Orthopedic procedures are restorations of departures from the anatomical norm, including shape, conformation, posture, or motor or circulatory equipoise. They are applicable also to a large proportion of all clinical problems, especially posttraumatic or postoperative. Self-acquired or attitude (posture) deformations may be visualized as due to such compensatory maladaptations as the body is impelled to make by reason of secondary effects (chiefly sensory) of protracted irritation whereby functional equipoise in static as well as motor mechanisms is altered; also they may ensue on traumata of less or more severity. Posttraumatic or postoperative orthopedics is another matter, differing both as to degree and kind. A large proportion of these self-acquired deformations or distortions or disfigurements are so mild as to be scarcely noticeable, and demonstrated only by expert observation or palpation. Many require little more than replacement by passive (manual) or by actively directed effort (kinesitherapy). Few, comparatively, need severing of tissues (surgical interference), or complete fixation, or immobilization by apparatus. Moreover, many, indeed a large proportion of, deformations are due to tonic spasm, to local exhaustion of reflexes caused by pain, by pain reactions, and will disappear on kinesthetic regulation of activities, especially after localized rest (akinesia), or by constructive suggestion, relaxation, by precise direction, by regulation of psychomotor tension, by tactfulness, subtlety, such as diversion of attention, and by mental substitution. Hence the mind demands adjustment, compensatory and regulatory procedures. To secure the psychophysical equipoise, I find that tactile suggestions must supplement mental suggestions—usually both are needed; that is, the overwrought part is most readily controlled by adding guiding touches to direct suggestion.

Thus it is evident that orthopedic measures may be divided into

(1) *surgical orthopedics* and (2) *medical, or, better, educative orthopedics*. This latter includes mechanistic, manipulative, or biokinetic orthopedia. The main theme of this communication is the educative.

As to the medical or educational orthopedia, this subject is so large as to embrace the whole domain of internal medicine and its abundant resources. Body defenses are to be studied in the light of their status—that is, original, acquired, depleted, or deteriorated. There is no more important subject than determining how body defects may be set in order. It matters less how these deformations have been acquired, and to what extent, than it does as to their form and manifestation. Hence the state of nutrition always looms large and demands primary attention. Each clinician has his “flair,” his point of view, his plan of remediation. All roads, however, lead to Rome—the one goal being constitutional reinvigoration. Through special studies of the ductless glands, the internal secretions, many problems yield to the light shed by a study of these great autoregulative governors. These functions are capable of at least partial regulation by means of the several forms of orthopedia.

By the term educative or mechanistic, manipulative, or biokinetic orthopedia, I would postulate:

Man, after all said and done, is a sentient mechanism; very sensitive, capable of self-regulation, and, to a great extent, of self-repair, whenever suitable conditions are supplied. None the less is man a mass of biophysics, of static, mobile, interacting motor and psychomotor mechanisms, among which are framework, tubes, fluids, containers, pumps, distributing channels, reflexes, muscles, bellows, gases, cells, and divers reservoirs of energies.

The mechanistic concept, while partial, is quite as significant and practical as any other. When the psychic status is pretty well grasped, gauged, and the internal processes—biochemical, nutritive, and respiratory—are fairly assessed, it then seems we are in a position to *give equal attention to the makeup as a whole*. Here the body, as an engine for the regeneration and the transmission, transformation, elaboration, and application of forces, deserves attention.

We are told by those surgeons who have had experience in the war zones that *practically all treatment of injuries comes within the strict interpretation of orthopedic remediation*. The attention bestowed on the wounded or shocked requires from the very first special care in replacing the injured parts in the most favorable attitudes, and in immobilizing them during the jars and jolts of transit, and often after reaching the base hospital. Then throughout the treatment, adjustment, adaptation, and compensation are constantly needed, not only to prevent subsequent deformity, but to defend the integrity of the parts and preserve their functional competence.

Hence it is desirable that our *students of medicine*—those who may soon or late undertake military service—*should be given particularized instruction and training in principles of orthopedic prevention, remediation, and reconstruction.* Much progress, so it seems to me, could be made by standardizing, by systematically grouping, all therapeutic agencies and measures. The fact is being made plainer every day that the principles on which these are based interdepend—that they interact helpfully. *Experts in one or the other line should be encouraged to cooperate from start to finish in a case.*

The particular purpose here is to direct attention to certain *common denominators*, or elements common to a considerable group of restorative agencies which act through systematizing and teaching anatomical regulation. To these may be applied the term *orthopedic.* *By orthopedic we postulate the prevention and correction of deformities.* These deformities are perhaps describable as disturbances of adjustments, of dissonances, inequalities, discompensations, imbalances, neutralizations, or nullifications. They produce confusions, and are evidenced by functional perplexities, involutions, entanglements, turmoils, agitations, discords, anomalies, disorganizations, down to chaos. They are not diseases, but are *exhibited in diseases*; not only in chronicities, but more or less in acute disorders.

The outstanding feature to be emphasized is the element of *orthopedia as applicable to most clinical problems.* And first:

Mental Orthopedia.—Such a welter of psychotherapeutic “systems” are afloat, surging through all grades of social and religious doings or enterprises, that some confusion must prevail both in the profession of medicine, and even more so among the laity, who range themselves in groups of proponents or protagonists or adversaries. Many points of resemblance are shown to the ecstasies and subjective mental distortion of religious prejudices. These partisan advocates or proponents stand in detached groups, each enthusiastic as to the peculiar merits of what they choose to indorse as the one “means of salvation.” Anyone who will flounder (as I have done) through the mysteries of several—the chief, perhaps—of these cults, from old-fashioned faith cure to psychanalysis, taking a fling at Dowieism, Christian Science, New Thought, and the like, will acquire a stable equilibrium and come to one’s senses by reverting to the teachings of the late Weir Mitchell and, more recently, Boris Sidis. Through the methods of both these master minds certain *common denominators* are plainly distinguishable, thus crudely described:

After learning all one can of the significant points in the history of the patient, which means much more than collecting all the symptoms, earlier experiences among sick beds or physicians, or

the data available through laboratory tests or therapeutic work-outs or "provings," there remains much to acquire as to *the manner or type of human being which confronts us*, judged by his earlier upbringing, his native (inherited) trends, tropisms, environmental quirks, his psychic and moral vulnerabilities; also how, where, and when he got thrust off from the right or profitable directions. Also, how he now lives, works, plays, devotes his energies to, and especially *what he now believes and why*. In brief, where he not only stands, but "gets off."

All this helps much, but one measure, too seldom practiced, remains to put to use; that is, to make a companion of the patient, live with him; see him in his daily life as much as can be—e. g., eat with him, walk with him, drive with him, sit and dwell, if possible, more or less. By such means—and even a busy man can find time to compass the ambit—*the creature is revealed as he is*. Then, and not until then, can one begin to evaluate the factors, and to carry out a consistent campaign.

For the rest, for the particular measures applicable to each, we may safely leave to the trained experience of any competent medical man. The problem then becomes one of disentanglement of the real from the unreal, the significant from the insignificant, the implantation of the word in season, a campaign of doings and equally of *not* doings. The problem will thus become gradually reduced to certain simple, but important, ingredients capable of being worked out by common sense and the limitless resources of medical science, including always the highly qualified specialists available.

Throughout the whole process—which, by the way, is not nearly so complex or time-consuming as it sounds—every act, every suggestion, every recommendation, every rebuke must be correlated with the bewildered mind, volition, capabilities of behavior of the patient. Self-regulation is the keynote. Unless this is established as a governing principle, no cure will be complete or permanent.

III. DEVICES TO SUPPORT OR REINFORCE UNDERDEVELOPED, OVERSTRAINED, DAMAGED, DEFORMED, WEAKENED, OR PARALYZED PARTS.

Devices for reinforcing or readjusting impaired parts include orthopedic or surgical agencies and procedures applied to so-called medical conditions—i. e., states of external or internal derangements. Among these are supports for enteroptosis, or displacements of the intestines, heart, or of lungs. The thorax should be developed by bringing about increased size or roominess of the upper body until it becomes larger than the abdomen. Support or fixation (immobilization) is often needed in pleurisy, in tuberculous lungs, in chronic backache, in latent or acquired deformities (as from wounds, contractures), stoop shoulders, back curvatures

(scoliosis), paralyses, visceral stases, kinks, adhesions, etc. Belts or girdles, such as Longstreth's, Kilmer's, Momberg's, Rose's, Dawbarn's, etc., are most useful in many exhaustion states, asthenias, in relaxed and pendulous bellies, in disorders of the heart or blood vessels; especially of the abdominal (splanchnic) circulation, in particular hypotension; also in sacroiliac disorders, sciaticas, neuritis, etc. Specially devised, supervised, or modified hip supports or corsets raise and sustain relaxed belly walls, and hence the abdominal and pelvic contents are put into positions of advantage. Abdominal supporters supply corrective pressure to blood vessels and tubular structures, and are of special value in regulating the function of pelvic organs. Braces and cuirasses, such as orthopedic surgeons apply, are useful in relieving local conditions of weakness in muscles, joints, ligaments, and the like. Lateral supports, fixation during decubitus—e. g., long splints, sandbags, etc.—are helpful in curing sciatica and neuritis in limbs. They are valuable in relieving pain and tenderness in acute inflammation, as in rheumatic fever or any inflamed or painful joint. Rubber tissue is particularly useful for local support in disordered circulation. Pillows, cushions, wedges of soft material, rolls or pads of fabric, supply rest to tender or inflamed parts of the body; also elevating the mattress by thrusting under it rolls, to fit special localities. Bandages and rubber tissue are of value in acute diseased states, in rheumatism, etc., to support weak and relaxed tissues, veins, engorged vessels, etc., in diseased, overused, exhausted, or toneless (asthenic) structures. Splints are used for divers inflamed, weakened, injured, or contracted joints, for threatened pus formation, and for spasm, for partial paralysis and paresis.

Adhesive plaster or thin rubber tissue used as a support is invaluable for relaxed or painful or overdistended tissues. It is applicable in varied acute states, pleurisy, pleurodynia, and localized inflammation of the lungs; also in spasmodic states, in visceroptosis, and fibromyositis of abdominal parietes. These disordered states may simulate acute or chronic disease of abdominal viscera, appendicitis, and the like. It is often advisable to begin treatment by counterirritation with tincture of iodine or cantharides and a plaster strap. Adhesive plaster is useful temporarily in enteroptosis until the external abdominal muscles, especially the transversales, psoas, quadratus lumborum, and iliaci regain tone and power from suitable support, which greatly abets training.

Specialized shoes are used for support of weakened arches or correcting deformities, *but should be only temporarily used*; the real cure is by training of the impaired structures in prehension. The cause of 45 to 65 percent of cases of so-called "rheumatism of the foot" is due to weakened arch. Longstreth's "elevation" to allow the calcaneum to rotate and rest in a hollow, and thus avoid

undue pressure on calcaneo-metatarsal ligaments, is vastly preferable to full arch supports. A flexible shank in the shoe, soft moccasins, and the practice of walking barefoot are also necessary adjuncts in the treatment of this class of disorders of the foot.¹

Following is a partial list of the diversified orthopedic (orthobiotic) procedures and apparatus with which the expert in gross surgical procedures becomes familiar: Trusses for actual or threatened hernia and weak rings. Athletes use a testicle supporter which is very useful also in asthenias. Jürymast for support or traction in diseases of cervical and upper thoracic vertebræ; also in many forms of disability, as in paralysis following diphtheria and poliomyelitis. Plaster casts or paper molds, troughs, along with flexible splints and bandages for limbs, hips, shoulders, thorax, etc. Supporting corsets, fixed or flexible, special belts, girdles, abdominal supports, etc. Cuirasses for spinal disease, slight scoliosis and paralysis. Traction or suspension apparatus—e. g., regulated vertical or horizontal traction in tabes, contracted back, sacroiliac disease; in retarded growth, poliomyelitis, fibromyositis, sciatica, etc. Plaster of paris, adhesive plaster, and rubber tissue act as splints for fixation or immobilization in paralysis due to cerebral and local conditions, poliomyelitis, etc.; indeed in any condition of impaired motor control; in short, wherever support can aid in preventing excessive movements, or reinforcing weaknesses in acquiring mobility, flexibility, elasticity. Full movability of joints and tendons is essential to integrity of motor and static function. Full flexibility of muscles is necessary to maintain motor competence, prompt response to volition, transference of motor stimuli, to secure normal reaction times, and to permit and encourage ebb and flow of fluids and nerve impulses.

Normal mobility of the backbone is essential, not only to the function of the vertebral supports, but also to maintain the integrity of the spinal subcenters, normal innervation through the lateral branches of the spinal nerves, rami communicantes, etc., in order to preserve vasomotor and visceromotor competence, normal ebb and flow of fluids; also the inherent circulatory rhythms.

Rigidities and loss of elasticity or muscle tone are common in young as well as old, especially after injuries (fractures, sprains) or certain diseases—e. g., fibromyositis, arthritism, and scar tissue formation. They may also result from periods of enforced sedentary life, long convalescence, chronic irritation, disuse, splinting, and may be due to local tonic spasm or vagatony. Rigidities are especially hurtful to function in structures of the chest and thorax. They impair respiration and they impede cardiovascular action and lymph propulsion. For example, in muscles of the neck protracted

¹See article by author, "Repair of Flat Foot," etc. (New York Medical Journal, Nov. 10, 1917).

rigidities cause interference with passage of body fluids to and from the head, deranging function (hydrostatic) and structure of the organs of special sense and of the brain also. Insomnia is often curable by mobilizing neck structures and loosening a rigid scalp.

Among the most important of devices to act as substitutes for Nature are artificial limbs (prosthesis); a strictly surgical or orthopedic measure, but *many devices meet on a common ground of the internist and surgeon*, among which are various familiar supplemental devices, mechanisms, agencies—e. g., artificial limbs now wonderfully perfected, also glasses to correct refraction errors and muscular anomalies, colored glasses to modify light, etc., artificial teeth, bridges, crowns, agencies to aid hearing, to supplement the body in numberless directions and forms.

IV. ELECTROTHERAPY, BALNEOTHERAPY, AND KINESITHERAPY.

Finally a few brief remarks on electrotherapy, balneotherapy, and kinesitherapy. As to the first two—electricity in its manifold modalities, including phototherapy, roentgenotherapy, radiotherapy—so specialized a subject deserves attention from experts in these domains. So of baths, hot and cold water in its definite applications, we may leave that to specialists for the moment. As to muscle training—kinesitherapy—that, too, is “a large order” and deserving of particularized consideration later.

Briefly, muscle training in conditions of protracted disability in disuse crippling, deformation and painful states due to tonic protective muscle spasm, in partial paralysis, in paresis, etc., should be governed by plain and practical rules controlling economies in force transmission, transmutation, and application.

Among these are positions of advantage or lessened disadvantage; attitude, from which movements are to be made; these are both static and motor, fixed and mobile positions, starting points. Then come methods of distribution—the best one is from a position of perfect relaxation, with gradually increased force to point of fullest tension, then hold for a second or two. This both in extension and flexion; indeed, also of torsion. Thus a muscle is capable of doing its full work on each movement. Anything less than this is futile, and fails to coordinate all along the line from center to periphery.

THE BACTERIOLOGY OF SPANISH INFLUENZA.

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Before dwelling directly on the subject of the bacteriology of Spanish influenza, a consideration of certain aspects of respiratory infections as a class may be fruitful in orientating ourselves in this subject.

It is a peculiar fact that our knowledge of the bacteriology of the infections of the respiratory tract frequently gives meager exact evidence of the etiology of these conditions. Several organisms are encountered in nearly every respiratory infection. The determining of the etiologic role and of the relative importance of the demonstrable organisms has frequently presented insurmountable difficulties. If the etiology of the common cold and other common infections has not been clearly established, it is to be expected that the solution of the etiology of Spanish influenza will not be accomplished without difficulty.

In the sputum of pulmonary tuberculosis there are usually found the same organisms, excepting the tubercle bacillus, as are found in bronchitis, in pharyngitis, in the common cold, and in influenza. There are a variety of organisms all of which may be present in different respiratory conditions; in conditions clinically the same a dissimilar bacteriology may be demonstrated; in conditions clinically dissimilar the identical organisms may be found; the bacteriology of any one condition in a given patient frequently shows variations during the course of the infection. In view of these considerations it seems evident that there will be great difficulty in determining the importance of a particular organism as an etiologic agent.

The following table was arranged from data given by Allen:¹

	No. of cases.	B. influ- enzæ.	Pneumo- coccus.	Strepto- coccus.	M. catar- rhælis.	M. parate- tragenus.	B. septus.	B. Fried- lander.	Staphylo- cocc.	B. coli.	Strepto- thrix.	Proteus.
Nasal and postnasal												
catarrh.	145	43	66	41	66	18	26	5	—	—	—	—
Common cold.	90	16	5	26	58	52	74	11	—	—	—	—
Sinusitis.	30	73	47	33	50	7	3	7	20	3	—	—
Pulmonary catarrh and												
bronchitis.	104	40	52	53	72	23	2	7	—	—	3	—
Asthma.	51	12	26	96	72	20	—	—	—	—	—	—
Pulmonary phthisis.	42	15	33	81	76	22	2	4	28	—	—	4

In the above table the first column of figures represents the number of cases of the listed infections which were studied bacteriologically, and the numbers in the following columns represent the percentages of cases in which the listed organisms were demonstrated. From the data included in this table the following observations may be made: (1) None of the listed respiratory infections show a characteristic bacteriology; (2) no organism was found in all the cases of a particular affection; (3) the bacteriology of all the affections listed is essentially the same.

There are other respiratory diseases and diseases with respiratory manifestations a consideration of which may aid us in assuming a proper attitude on the important question of the bacteriology and etiology of Spanish influenza.

We accept the etiologic relationship of the Klebs-Löffler bacillus to diphtheria, but do we usually give proper consideration to the following: If a pure diphtheria bacillus infection were possible, what would be the symptoms, physical findings, the complications, and mortality of the resulting disease? Is not the disease diphtheria, as we know it, caused by the diphtheria bacillus associated with the organisms which are more or less common to all respiratory infections!

The Bordet-Gengou bacillus is essential to pertussis, but this organism, unassociated with others, cannot, in all probability, be alone responsible for the clinical disease. Not only in the uncomplicated disease, but more particularly in its complications, the organisms which are commonly present in all respiratory infections play a very important role.

The attitude which some authors assume toward the etiology of pulmonary tuberculosis will further elucidate the writer's attitude on the subject of the etiology of all respiratory infections, and more particularly the attitude which he is compelled to assume in regard to influenza.

In the same lung at autopsy there frequently may be demonstrated healed calcified tubercles and also the pathology of the malignant devastating disease, consumption. Most tuberculous infections are benign, self-limited, and unrecognized clinically. What is the essential difference between benign infection and malignant tuberculous disease? It is not claimed that the explanation which is advanced is without exceptions.

According to this explanation, uncomplicated tuberculous infection of the lung produces a benign condition, whereas the familiar pulmonary tuberculosis is caused by the tubercle bacillus plus the organisms which are common to the entire group of respiratory diseases.

It will be seen, then, that it is the contention of the writer that respiratory infections as a class have not a *single* etiologic factor;

there may be several exciting agents for any infection. In those infections which are dignified as specific diseases, as pertussis, measles, diphtheria, and tuberculosis, the usually accepted causative agents are looked on as *essential*, and the other organisms as a class are essential to the clinical disease; but the presence of any one of the secondary organisms is unessential in provoking any of the diseases mentioned.

In measles the essential etiology is unknown, but the importance in this disease of the secondary organisms is usually recognized. In certain affections, as in sinusitis, there is probably no essential bacteriology; but in others, as in the contagious cold and in epidemic and pandemic influenza, we are led to believe that there are essential exciting agents.

From analogy, then, we are led to believe that Spanish influenza, the clinical disease as we know it, is caused by an essential organism in relationship with a variety of other organisms. The latter are unessential individually, but as a class they are essential to the clinical disease and more particularly to its complications. Variations in different affected individuals in the unessential bacteriology accounts in large part for the extreme variations in the clinical disease as encountered.

As regards the essential agent in influenza, the writer is unable to introduce and to dismiss the subject with the statement, "It is sufficient to state that the *Bacillus influenzae* of Pfeiffer has been established as the etiologic factor in this epidemic."² It is not the purpose of the writer to deny that either the *B. influenzae*, or that any other organism for which claims have been advanced, is the essential cause of the pandemic. He desires to review the most important evidence on which opinions have been based, and to reiterate the nature of the evidence which must be forthcoming, before the etiologic relationship of an organism to a disease may be established.

The available reports on the bacteriology of Spanish influenza reveal rather wide variations in the bacteriological findings and in the interpretation of these findings. The majority of American investigators who have written on the subject favor the *B. influenzae* as the essential cause of the disease, while European investigators seem to favor other organisms.

Bezançon³ in Paris found the pneumococcus to be the decidedly predominant organism. Little and his associates,⁴ working a European military camp, were unable to demonstrate *B. influenzae* in any of 20 cases of influenza. They concluded that the causative organism is a diplococcus, which Keegan⁵ suggests may be a pneumococcus. Gotch and Whittingham⁶ studied 50 cases in England. They found a catarrhalis-like organism in every case, frequently associated with *B. influenzae* and other organisms. They believe that

they produced typical influenza by introducing this organism (*catarrhalis*) to the mucous membrane of the nasopharynx of two healthy individuals. Certainly evidence of such weight has not been offered in favor of any other organism, including *B. influenzae*. The authors mentioned have found the pneumococcus, the *M. catarrhalis*, the streptococcus, and less frequently the *B. influenzae* and other organisms.

Recently from the United States Naval Hospital at Chelsea, Mass., Keegan found practically the same bacterial flora in influenza as that given above. He found the *B. influenzae*, but how frequently he did not state. He also found this organism in cultures from control individuals. He attaches etiologic importance to the influenza bacillus chiefly on the ground that it was found in the lungs in 82.6 percent of 23 cases of fatal influenza pneumonia, and in 6 of these in pure culture.

In conditions apparently analogous to influenza pneumonia, very few have allowed themselves to be misled by the weight of such evidence. Bronchopneumonia is frequently a secondary and terminal complication in numerous infectious and noninfectious diseases. Do we usually conclude that the organisms found in terminal pneumonias are the cause of the primary disease? When we find that cancer patients and diabetics may die of pneumococcus pneumonia, and that it is the streptococcus which causes a very large number of fatalities in measles, smallpox, and scarlet fever, do we conclude that we have learned anything about the essential etiology of these diseases?

Negative throat cultures, so far as the *B. influenzae* is concerned, Keegan attributes to the difficulty of isolating the organism from mixed cultures. He also assumes that the focus of the infection is some not-easily-accessible recess in the nasal cavity.

Another explanation for negative cultures is given by Allen: "The results of examination of smears of secretion are not always confirmed by the results of plating experiments. For instance, a smear may show vast numbers of what appear to be *B. influenzae*, while a plate prepared from the same secretion may after even three days' incubation fail to show a single colony of that bacterium; confirmation therefore is lacking of the identity of the bacillus seen in the smear." Allen also states, in explaining the negative cultures of another worker: "The complete absence of *B. influenzae* I can attribute only to the omission of observations on direct smears and to a possible insufficient incubation period for the culture plates. During the past twelve months the *B. influenzae* has been very slow of development." These remarks were not made in reference to clinical influenza; nevertheless they serve to indicate the variable difficulties which may be encountered in attempts to obtain the *B. influenzae* in cultures from respiratory infections.

It is of interest to know the incidence of *B. influenza* in influenza and in its complications. But, whatever the incidence may be, whether it be found to be 10 percent or 100 percent of the cases, the essential etiology of the disease will remain open to question until evidence of a different nature is forthcoming. Even the constant association of an organism with a disease is very inconclusive evidence that the organism is the cause of the disease. This is most especially true when the etiology of a respiratory infection is under consideration, and when the suspected organism is known to be present in a large number of all types of respiratory diseases and is also frequently present in the healthy respiratory tract.

B. influenza may be present in influenza much more frequently than the majority of reports would seem to indicate. Park⁷ states: "With our present technic we have found the influenza bacilli in almost every case of clear-cut infectious influenza. In complicating pneumonias we have found them associated either with streptococci or pneumococci. In one case the bronchopneumonia was due entirely to the influenza bacillus."

Schorer⁸ has reported that "there can be no doubt that the epidemic is due to the influenza bacillus, but the pneumococcus and hemolytic streptococcus are responsible for some of the severe complications." He also reports the presence of nonhemolytic streptococci and the *M. catarrhalis* in some cases. His reasons for considering the influenza bacillus the essential agent in influenza are of the same nature and are as inconclusive as those of others who have come to the same conclusion.

An intensive study of the occurrence of the influenza bacillus in any respiratory infectious disease might mislead one to believe that the influenza bacillus is the cause of the disease. Allen states that the influenza bacillus is present in about 90 percent of the cases of pertussis. The frequency with which the influenza bacillus is found in measles prompted Hektoen⁹ to state: "The comparative frequency of *B. influenza* is of considerable interest, and it may be well in the further study of the bacteriology of measles not to lose sight of this bacillus."

Influenza may be due to a filtrable virus. Certainly the single negative experiment of Keegan and Rosenau does not altogether preclude such a possibility.

It seems possible that the exciting agent may be biologically related to the viruses of measles, scarlet fever, or smallpox. Epidemiological evidence possibly will justify the belief that influenza is etiologically more closely related to the acute exanthemata than it is to the known bacterial diseases. The extreme communicability of influenza and of the acute exanthemata suggests a biological relationship between the exciting agents of influenza and the latter diseases.

The etiology of influenza remains unknown or not properly substantiated. A disregard of Koch's postulates, especially in a respiratory disease, may lead to error, as has such a disregard led to error in several instances in the past. The statement that there exists in the minds of many a prejudice in favor of the influenza bacillus, and that this prejudice has delayed progress, seems justified.

The methods of investigating this disease should be broadened. Every available method should be used. It should be emphasized that a bacteriological study of this mysterious disease based on the results of blood-agar cultures constitutes a superficial investigation.

An attitude on this subject which is devoid of prejudice and false tradition is necessary to its solution.

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WAR CONDITIONS AND CIVILIAN TUBERCULOSIS CONTROL.*

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It is the object of this paper to pay special attention to municipal problems in tuberculosis control, and to present the subject more from the point of view of the intimate control over the tuberculosis case in the average American city than to attempt an extensive analysis of the way in which the war has affected the national tuberculosis question. Others have dealt with this aspect many times, much more effectively than could the present writer. Certainly the municipality is a most important unit, from the functional aspect, in tuberculosis control. It is here that agencies come most frequently in direct contact with the problem. Further, it is to this type of community that the experience of the writer has been largely confined in tuberculosis work.

Everywhere one finds increasing evidence that the war has magnified the extent and seriousness of tuberculosis. The draft examinations have shown that tuberculosis exists to an unsuspected extent in this age group. Approximately 40,000 men were rejected in the first draft as tuberculous. Of the men who passed the draft boards another 10,000 were subsequently discharged on account of tuberculosis, giving a total of 50,000 men. It has also been stated that among the soldiers being returned from France, for one cause or another, an extremely large percentage is sent back as a result of the development of tuberculosis. Finally, should the war continue, the experience in the other countries would lead us to believe that the combination of privation and overwork at home will lower resistance to disease and increase the prevalence of tuberculosis in the civil population. A reduction of food supply in both quantity and quality is likely to induce a state of undernutrition, particularly among children.

Among adults excessive work, mental stress, and worry will lower vitality and increase susceptibility to infection and disease. These indirect effects of the war are clearly evident abroad, and will undoubtedly become increasingly evident in America if the war should continue.

Evidence of increase in civilian tuberculosis is shown directly

*Presented before the Sociological Section at the Chicago Session of the American Public Health Association, December 9-12, 1918. By courtesy of the American Journal of Public Health.

by the statistics of the warring countries. The registrar general of England reports an increase of 16 percent in 1915 over the preceding year. In Holland the tuberculosis death rate per 100,000 jumped from 154 in 1915 to 180 in 1916, while reasonably reliable data coming out of Germany indicates a 50 percent increase in tuberculosis mortality in Berlin in 1917 over the preceding year.

It is the plan of this article to discuss first the routine health machinery for tuberculosis control which to a greater or less extent has already been accepted and established as standard in the average American community. It is then proposed to indicate how, on a basis of recent experience, particularly in Framingham in connection with the Community Health and Tuberculosis Demonstration, this routine machinery may profitably be expanded to meet the urgent needs disclosed and augmented by the war. Without adopting hard and fast limitations, there may be presupposed a typical American community, autonomous industrially, with mixed races, varied economic groups, and an average health machinery, together with the usual medical constituency.

What are the devices which the average community has already in some degree developed for the detection, control, and elimination of tuberculosis? In a general way these may be indicated as follows:

1. Tuberculosis dispensaries.
2. District nursing, primarily for the home treatment of tuberculosis cases, and in certain instances for the detection of the disease.
3. Hospitals and sanatoriums for the treatment of institutional cases.
4. Certain allied activities which tend to some extent to affect the problem, including infant welfare work, medical school inspection, industrial clinics, etc.
5. The educational, recreational, and health creative activities, aiming toward an increased resistance to infection and disease.

From the war point of view as it affects the civil population, what are the main points to be emphasized at the present time, and what are the particular items of municipal equipment that might presumably be added to complete the community's defense against tuberculosis?

1. It is first necessary to recognize the magnitude of the job. Tuberculosis exists in the civilian population to a greater extent than has been realized; it can be found and brought under control, and should be found early, for there lies the hope of ultimate eradication. These premises, particularly those bearing on the extent of tuberculosis and the ability of the average community to find the disease, have been substantiated by the Framingham experience. In 1916 there were 40 known cases of tuberculosis in Framingham,

which was 25 percent of the population, or 3 cases to every death. During 1917, and including 1918 to August 15, there were on record 224 cases. Of these, 27 were inherited from 1916, 96 were discovered in the special medical examination drives, 9 were found in the draft, 37 were found through the expert consultation service of the Community Health Station, 31 were reported by private physicians, 2 were found in the factories, 10 were discovered by the school physician, and 12, coming from miscellaneous sources, were still held as suspicious cases. In contrast to 27 living known cases at the beginning of 1917, there are now 177 living cases, 34 of which are incipient, 49 advanced, 82 arrested, and 12 suspicious. Of the 4,473 individuals examined in the special medical drives, 96, or 2.16 percent, were found to be tuberculous, instead of .25, as was the case in 1916. This would mean that there should be in the community 367 cases, or 21 cases for every death instead of 3 for every death, as was the case in 1916. It is believed that it is safe to assume that the group examined were fairly representative of the community at large. However, 56 percent of the cases discovered were arrested, which would leave 161 active cases in the community, or 9 active cases for every death. Presumably, this is about what ought to be under care in the average urban community in the United States.

These medical examination findings, together with the draft, have shown clearly that tuberculosis is there, and can be found if it is looked for.

2. Obviously, more adequate facilities are needed along all lines, including dispensaries, hospitals, nursing service, etc. Better methods of home treatment and isolation are essential. The recognition by the average citizen that tuberculosis should be handled as a communicable disease is vital to its effective control. Legislation for the control of incorrigibles would also seem to be desirable in many places.

3. More extensive and more aggressive health creative work, carried out on a community-wide basis, would aid in establishing a firmer foundation of health and would increase resistance to tuberculosis. Prominent among the agencies of recent origin which may be used in this work are the Junior Red Cross, the Health Crusader organizations in the schools, the recreation program backed by the national Government, the Baby's Year program of the Federal Children's Bureau, etc.

4. As a general health program, aimed particularly at tuberculosis control, in addition to the routine measures mentioned above, there are certain special measures which should be emphasized, which aim at particular age groups, and which provide for the discovery and treatment of the disease as well as for its prevention. These may be briefly itemized as follows:

(a) Milk sanitation. It has been recently pointed out by Cobbett that that percentage of cervical adenitis among children which is definitely tuberculous is of bovine origin in 75 percent of the cases. The universal pasteurization of milk, probably in a central plant under official control, would seem to be the only immediate and really expedient measure for the meeting of this situation.

(b) Infant welfare work. The general hygiene of the infant, the protection of the infant from adult human infection, the control over nutrition, extending especially to the preschool age, are factors of prime importance in resisting the spread of infection and the development of tuberculous disease in this age group. It is generally accepted that most tuberculous infections occur at that time. A recent Von Pirquet tuberculin study of children between the ages of 1 and 7 years in Framingham indicated that 33 percent of them had already been infected, though up to that time the cases of actual disease were very few.

(c) Thorough medical supervision for the school population. For every 3,000 children there is needed a minimum of one full-time physician, with two nurses, with adequate clinical facilities. An equipment approximating these requirements in Framingham in the last year, examining about 2,500 children, discovered 10 positive cases of tuberculosis, and has under observation in addition 64 suspects.

(d) Factory medical work. Full-time medical, nursing, and clinic service for industrial workers is particularly vital at this time if the producing army is to be kept fit. This service may be largely diagnostic in character, the treatment facilities being found outside the industry, either through private medical service or as a result of the establishment of pay, self-supporting clinics, with paid doctors. Adaptable to the smaller plants is the cooperative plan of sharing the part time of physicians and nurses trained for industrial work.

5. It is, of course, necessary that each community provide adequate machinery for the follow-up of tuberculosis cases brought out by the draft examinations, returned from the cantonments, or sent back from France. This, being a direct and obvious war problem, will probably be more readily recognized by the civilian health authorities as one needing immediate provision than some of the more indirect phases outlined above. Of course, the recent influenza epidemic has greatly increased the need for adequate follow-up machinery.

6. In addition to these general semi-routine measures, the Framingham experience has indicated the worth of certain special measures, which, when definitely determined to be of permanent value, should presumably be adopted as a part of the regular machinery in the ordinary municipality. For convenience, these measures may

be considered as they affect the discovery, the diagnosis, the treatment, and the prevention of tuberculosis.

I. THE DISCOVERY OF TUBERCULOSIS.

(a) A community-wide general examination campaign. In Framingham this has been carried out largely with the aid of outside physicians, who, with the necessary nursing and laboratory assistance, have examined extensively in the homes on a family basis. Approximately 5,000 people have been examined to date in this way. This stimulates an interest in life extension work in general, aids in gaining the interest and cooperation of the local physicians, finds a large amount of tuberculosis, and leads to adequate follow-up measures. As stated above, 2.16 percent of those examined in this way, or 96 cases in all, were found to be tuberculous.

(b) The consultation service. Growing out of the examination campaign has come an expert consultation service, which is an extremely valuable adjunct to the ordinary dispensary facilities. Experts are provided on either a free or pay basis, and are at the call of the local physicians in doubtful cases of disease, particularly tuberculosis. In this way 37 cases have been discovered thus far, and consultations are now held with local physicians continuously, practically all of the physicians using the service. This service, of course, requires expert training and, obviously, considerable tact on the part of the specialists. The advantages are that it finds the doubtful cases, relieves the local physicians of the burden of assuming a diagnosis, and, through contact with the local physicians, greatly increases the control of the home cases.

(c) The stimulation of reporting. Through the examination work and consultation service, and through the cooperation of the local physicians, the reporting of disease may be augmented. During 1906 to 1916 in Framingham the local physicians reported an average of 13 cases a year. In 1917 they reported 59 cases. Many of these were incipient cases and were discovered through an increased interest in and knowledge of the disease on the part of the local practitioners.

(d) The development of neighborhood committees. In Framingham the town as a whole has been divided into a number of districts of approximately 500 people. In these districts the personal leadership and enthusiasm have been found, and local committees developed, the personnel of which represent the health station in the various neighborhoods and aid extensively in the dissemination of information, the carrying out of educational procedures, the development of examination work, the discovery of new tuberculosis, the confidential follow-up on incorrigible cases, etc.

II. THE DIAGNOSIS OF TUBERCULOSIS.

(a) A local medical organization. Through the development of a local medical club, under which auspices lectures and clinics are held and literature distributed, there may be fostered an increasing interest in the medical aspects of tuberculosis, reflecting itself in the frequency and accuracy with which early disease is diagnosed.

(b) Diagnostic standards. For use in Framingham and elsewhere, there have been developed, with the aid of special committees, standards for the diagnosis, classification, and treatment of pulmonary tuberculosis in adults and children, and for the diagnosis of tuberculosis cervical adenitis in children. These have been disseminated widely, and, in addition to their use in Framingham, have been circulated by state departments of health and other agencies extensively throughout the United States.

III. THE TREATMENT OF TUBERCULOSIS.

(a) Home control. A competent and adequate nursing service, the medical examination and consultation work, the educational work of the neighborhood committees, etc., all make more practicable the home treatment of a large percentage of the tuberculosis cases. In Framingham on May 1, 1918, out of 160 living cases at that time, only 16 were away for institutional treatment.

(b) The institutionalizing of advanced and open cases. Either by the municipalities or through state or private aid, there should, of course, be provided adequate institutional facilities for the care of advanced open cases that cannot safely or adequately, for social, economic, or personal reasons, be supervised at home. In Framingham in 1917, out of 18 deaths among advanced cases, 12 occurred in institutions.

IV. THE PREVENTION OF TUBERCULOSIS.

(a) An educational program. The use of exhibits, the development of health crusader clubs in the schools, the development of local lecture bureaus offering instruction and entertainment to clubs, churches, factories, etc., will aid in the promotion of a program for health creation.

(b) A children's health camp. As a preventive measure an opportunity is lost if those children most needing hygienic treatment are not provided during the summer months with open air, play, and supervision. This activity should presumably be developed primarily for nontuberculous, but delicate, undernourished, and anemic children. They may be selected through the examination work, through the preschool activities, by the school medical and nursing staff, in the tuberculin work if any is carried out, etc.

* * * *

The control and the cost of such a community program are of fundamental interest. While in some communities the school health work may be under the direction of the school committee, it would seem a safe assumption that for most places the central authority should, theoretically at least, rest with the town health officials. This is certainly true of the infant welfare work, the preschool work, the general sanitary work, and may in increasing measure, as communities become appreciative of their obligations, be extended to cover health educational work, special consultation and dispensary service, hygienic milk control, etc. Presumably for the time being the development of neighborhood committees, the establishment of factory medical service, and in large measure the special antituberculosis educational activities will have to be fostered under private agencies.

While the expansion of the recognized routine facilities to cover the special services mentioned above involves an increase in expenditure for the community, it must be realized that many of these services, such as the consultation service, pay dispensaries, etc., may become in part or wholly self-supporting. Without presenting any of the details, it may be briefly stated that in Framingham, where the community was spending about 40 cents per capita at the beginning of the health demonstration, the town authorities are now appropriating approximately 82 cents per capita for health work. It is further estimated that \$1 per capita would cover practically all of the obligations which the community at large would ever be called on to meet out of public funds. This would cover the infant, the school, the sanitary and the special tuberculosis work. In addition, about \$1 per capita is required for medical and health work in industry and for general educational propaganda. In Framingham at the present time private agencies are expending an amount nearly equivalent to this estimate. Consequently for a complete program approximately \$2 per capita is required, about equally divided between private and public agencies.

It is hoped that the results of the Framingham work may establish the permanent value of certain of the measures with which the health demonstration is there experimenting. While it is relatively expensive to initiate and carry out these measures, the perpetuation of much of the work on a routine basis, discarding the original experimental scaffolding, ought not to be an undue drain on the community's resources.

Certainly the civilian health situation requires increasing attention. The war will emphasize and augment our needs. While we must retrench on nonessentials, this embargo specifically does not cover legitimate community health activities. Never before was the necessity so great for the maintenance of the health of the civil population. If it is wise to say that any one thing won the war,

it was the fitness of the home army. From the tuberculosis viewpoint this offers a real opportunity to bring under ultimate control the nation's greatest preventable health menace. In closing we can do no better than to quote an appeal by Dr. Livingston Farrand, director of the American Commission for the Prevention of Tuberculosis in France, made during his recent visit to his country:

"If I may make an appeal to America, on the eve of sailing again for France, it is this: that the people of America throw themselves into the winning of the war against tuberculosis with the same zeal and efficiency with which they have thrown themselves into the winning of the war against the Kaiser. To make our country really safe for democracy, we must first make it healthy."

THE NATION'S NEED OF PHYSICAL EDUCATION.*

By WILLARD S. SMALL,

Specialist in School Hygiene, U. S. Bureau of Education.

EVIDENCE OF NEED.

1. Thirty-five percent of the men in the first draft were rejected as physically unfit. Allowing for underheight and special sensory defects, neither of which argue general physical unfitness, not less than 25 percent were rejected for real physical unfitness. That means 2,500,000, between the ages of 21 and 30, were unfit for military service; therefore unfit to render full measure of service in any capacity; therefore unable to get full returns from life in work and happiness. An equal number of women doubtless suffer from disqualifying defects.

2. Passing of the physical examination is no guarantee of fitness for immediate intensive military training. Only a minority of the men when they arrive at camp have the strength, endurance, agility, muscular control and versatility, and disciplined initiative necessary for the rigors of immediate intensive military training. This minority is made up largely of men who have had thorough and varied athletic experience under competent direction. The majority is lacking in one or more of the requisites. Much time is lost in purely physical training and conditioning.

3. Very few of these men know how to take care of themselves. In reply to an inquiry on this point, one camp officer replied, with humorous exaggeration, that a few of his men were acquainted with the toothbrush. Nearly all the men are physically uneducated; many of them are physical illiterates. And yet, in the words of another able camp officer, "the percentage of men under my command who return home safe and sound will depend more on knowledge of how to take care of themselves than on any other one factor."

4. Approximately 1,000,000 young men each year reach military age. If the war lasts, each year we shall be handicapped by a like percentage of rejections and of physically unconditioned men, unless effective Federal legislation is enacted.

5. There are about 25,000,000 boys and girls of school age, 6 to 18 years, marching along the great highway of youth. Numerous investigations show that at least 50 percent of these have defects and ailments that impede normal development in greater or less degree; that they live, at home and at school, in conditions more or

*Address before the American Public Health Association, Chicago, December 9-12, 1918. By courtesy of the American Journal of Public Health.

less unhygienic; that they lack the positive physical education—play, athletics, gymnastics, work—necessary to realize their potential man and woman power.

6. One state returns 85.87 percent of its drafted men as physically unfit; another state, only 53.33 percent—a variation of 32.54 percent. Between Pennsylvania and New York the variation is 16 percent. Federal legislation would not entirely eliminate these disparities. Differences of race, social heredity, and industrial and economic character are involved. It would tend to equalize such disparities and it would positively improve conditions in all states.

7. Economic disparities between states are very great. According to the best available statistics, California, for each child between 5 and 18 years of age, has property to the value of \$15,000; Mississippi, \$2,100. For each 100 children, Nevada has 180 men of 21 years and over; South Carolina has 58. Such disparities can be equalized only by Federal aid.

CHARACTER OF LEGISLATION NEEDED.

1. It should interpret physical education in a broad and true way, as understood by the most competent experts in school administration and in physical education. It must assume physical activity as the basic thing, but conditioned on and integrally related with wholesome physical environment, individual physical examination and record, medical supervision of schools and school children, development of health habits and instruction in health knowledge, hygienic school management and procedure, and cooperation with all agencies that make for physical upbuilding and the moral growth inevitably incident to sane, wholesome, active physical life.

2. It must provide for boys and girls alike. From the point of view of racial strength and integrity, physical upbuilding of women is of equal importance with that of men—perhaps of greater importance.

3. It should provide for all children and youth between 6 and 18 years of age inclusive. It should extend its benefits to youth above the compulsory school age by recognition of agencies already organized for doing such work, in the whole or in part; and by extension of the continuation school principle to include and secure a program of physical education for children in industry between 14 and 18 years of age.

4. It should provide for Federal aid to enable the states to erect and carry on thorough and effective systems of physical education. This Federal aid should be limited to preparation of teachers for skilled service and payment for skilled service.

5. It should provide for studies, investigations, and demonstrations for the purpose of developing progressively scientific standards in the field of physical education as interpreted.

6. It should provide for administration of the law through the established Federal and state educational agencies, and for the co-operation of the Federal Public Health Service with the Federal Bureau of Education in the administration of those phases of the law in which the scientific resources of the Public Health Service are necessary. It must guard against duplication of effort and conflict of interest.

7. It must guarantee the autonomy and initiative of the states. It must be so framed as to permit latitude of administration procedure according to the genius and traditions of the several states, and to encourage initiative and flexibility in the development of educational methods and processes. For example, the relation of education authorities and health activities within the states, in regard to administration of health supervision, should not be prescribed. The relation established between the Federal bureaus of education and of health might influence the states, but it would be unwarranted interference with state prerogatives to prescribe such a relation.

8. It should place primary emphasis on the creation and development of a plan and means for the preparation of teachers for this important educational work. No money should be expended for the payment of service until satisfactory plans have been made for the preparation of teachers.

9. It should provide safeguards for the proper and effective expenditure of the Federal appropriations, both in the use of funds for public purposes and of provisions by the states of adequate supplementary funds and equipment.

RELATION TO MILITARY TRAINING.

1. The program proposed is not a substitute for military training; with respect to boys, it is premilitary training. It is a program for producing physically fit boys and girls during the period of immaturity. The program stops at 18 years of age. Efficient military training should begin not earlier than 18 years. If universal military training should be adopted, this program would insure maximum preparation of a maximum number of young men for military training.

2. It is not exclusively preparatory to military training. It is for both sexes. It is for the strong and the weak. It is for efficient living—not merely for one function of life.

3. It would prepare for military training in the following ways:

(A) By selection of boys for military training:

(a) Through recurrent physical examination during the growth period.

(b) Through early detection and correction of remediable defects.

(B) By graded training:

(a) A graded program of exercises, scientifically selected and administered for all children of school age.

(b) Corrective gymnastics for special postural and muscular defects.

(c) Intensive physical training for the older boys who are potentially fit for military service. Athletics is the most effective instrument. The commander of one of the army training camps writes: "I have observed that athletes assimilate discipline quicker than any other class of men."

(C) By training in health habits, instruction in health knowledge, development of health ideals leading to a physical conscience.

(D) By increasing the physical efficiency of those fit for limited service only:

(a) By early detection of defects.

(b) By specialized training of such individuals.

(c) By keeping them out of inappropriate occupations.

WHAT WILL IT DO FOR THE NATION?

What such a program, wisely administered, will do for military efficiency, it will do equally for efficiency in all civil functions. It will do for girls what it will do for boys. It will raise the positive coefficient of the physical life of the nation. It will build morality on the solid foundation of physical soundness and vitality. It will be a powerful influence in Americanization. The democracy of the playground admits of no hyphenism of language; and the morality of the athletic field, fair play, and respect for the rules of the game is the very essence of Americanism.

It will not do the impossible. It will be only one of the social agencies in the immortal conflict between human progress and human retrogression. Good housing, adequate food, and sane regulation of juvenile labor are equally necessary. The enactment and operation of such a law as proposed for physical education will be a powerful stimulus and support to these other movements.

The poignant words of an editorial, "The Wasted Years," in the conservative London *Nation* (September 23, 1916) might well be our own confession and pledge of reparation:

"The war has brought home to most of us a sense of guilt and shame in regard to this dreadful waste of the vigor and the happiness of the race. . . . No self-respecting nation can go back after this war to the state of things which makes the proper development of the body and mind the luxury of a small and privileged class. This reparation at least we will make to the thousands to whom their country has given nothing and from whom she has taken their all. It shall never again be said that it is not until they are needed for the terrible uses of war that any care is taken of the mass of the youth of the country."

WHAT IS THE RELATION OF WAGES TO PUBLIC HEALTH?*

BY ARTHUR E. HOLDER,

Representative of Labor on the Federal Board of Vocational Education.

The health of the child is the strength of the nation. The power of a country, the happiness and security of a people, rests on the broad base of public health. The first duty of man should be to preserve his health. The first and most patriotic duty of a statesman should be to care for the health of the people.

What is the relation of wages to public health? It is not possible to adequately cover this question in the short space of fifteen minutes. The subject can be only roughly sketched. There is no problem more vital. The term "wages" is applied to the incomes of working people. The working people and their families constitute the majority of all countries. It is safe to say that in the United States the ratio is easily 9 to 1 if we include, as we should, agriculturists and such workers whose incomes are rated as salaries. It follows as a matter of course that whatever affects a proportion so large, automatically affects the relation of the whole. Therefore wages and health are reciprocally related, each affecting the other. The higher the wage, the better the health of the wage workers, may be accepted as axiomatic. The better the health of the wage workers, the better the health of the public. Improvement in public health means increased total production and prosperity, greater safety, more happiness. The reasoning is easy.

This leads us to other questions, vital parts of the original. First, are wages sufficient to keep the wage earner in good health? Second, is the public health maintained satisfactorily?

The flourishing existence of many large sick and beneficial societies, like the Odd Fellows, Foresters, Knights of Pythias, Knights of Columbus, Workmen's Circles, trade unions, Masonic and other fraternities merit a negative conclusion. Some assert that the very existence of such organizations is equivalent to an indictment of our present wage system and our lack of system in caring for public health. If statistical information is helpful to a clearer light, consider the following facts: In 1910 over 38,000,000 persons were engaged in gainful occupations. "Manufacturing and mechanical" absorbed 10,808,000. I select this, the largest group of wage earners, for my illustration, and find on analysis of census bureau reports that our industrial progress is unbalanced.

*Speech prepared for the meeting of the American Public Health Association, December 9-12, 1918, Chicago, Ill. By courtesy of the American Journal of Public Health.

THE WAGE EARNER'S SMALL SHARE OF WHAT HE CREATES.

In 1850 the value of our average annual per capita product in manufactures was \$1,064. Sixty years later, in 1910, the average per capita production had increased to \$3,125. Wages paid employees of manufacturers averaged \$247 in 1850. In 1910 wages had risen to \$518, an increase of only 109 percent as compared to 193 percent increase in average production. Carrying this analysis farther, we find that in 1850 the wage earner obtained $23\frac{1}{4}$ cents of every dollar's worth of value he created. In 1910 this proportion of product had shrunk so the wage earner got only $16\frac{1}{2}$ cents on each dollar's worth of goods he produced. This is the base or foundation of the question, "What is the relation of wages to public health?"

The next view reveals the first effect, which we may identify as "instability of industry," or "depression in business," more commonly known as "panics." This brings us to a debatable inquiry, "What causes panics?" High tariffs, low tariffs, gold standards, silver standards, good crops, poor crops, or spots on the sun? All of these and many more excuses have been given and explanations elaborately made by highly gifted scientific men. Unfortunately but few have seen the truth or grasped the facts that panics are brought about more by inequitable distribution of wealth than any other cause. Formerly when the laborer got 23 cents in wages for each dollar of his product, panics occurred about once in twenty years, as witness 1837, 1857, 1877. Since real wages shrunk to 16 cents on the dollar, panics roll around more frequently as the record shows—1884, 1894, 1907, 1914.

What has business activity or panics to do with public health? No other factor in modern life is so powerful, nothing influences our individual health more than severe changes in our economic life. During busy periods men work at high speed and high tension from early in morning until late at night. They are literally rushed to death. During panicky periods the workers and employers spend a large part of their energy and vitality fretting their lives away for fear their jobs or business will suddenly cease and leave them economically stranded.

This answers the question, and explains in concrete form the relation of wages to public health.

All medical men agree on three prescriptions for many human ills: First, "do not worry;" second, "take a rest;" third, "go away for a change." The first seems humanly impossible to avoid, the last are too expensive to indulge in by that great army of the public that work for wages. Hence small ills grow into great chronic afflictions—you physicians know the balance of the human story too well for further reminders.

This brings our query to the relation of working hours of wage earners to public health, and is answered by recalling your attention to the tenacity of the workers for eight hours or a shorter working day.

THE EIGHT-HOUR DAY ADDS YEARS OF LIFE TO WORKERS.

Wage workers find this the most effectual way to more equitably distribute social wealth and the greatest preventive of disease. Since the union cigarmakers adopted the eight-hour day in 1886, from twelve to fifteen years have been added to the average life of cigarmakers. The printers have added ten years to their life since they abandoned the 10-, 11-, and 12-hour day. Similar experiences have been proportionately recorded by miners, machinists, bricklayers, needle workers, carpenters, metal polishers, and thousands of other organized wage earners. Our trade union vital statistics also show that many years of life have been added to the lives of such wage earners who have shortened their work day and increased their wages. Every improvement in group health thus briefly described correspondingly improves the public health.

The greatest of teachers reminded us that "man shall not live by bread alone." Of course this means all men. We may lay too much stress on the bread-and-butter aspect of the worker's life, but it should not be forgotten that the wage earner, his wife, and children have a spiritual hunger. If time and means will not allow a satisfaction for this hunger, it means that essential joy is crowded out of the workers' lives, thus leaving them subject to nervous ills. Organized wage earners have been righteously jealous of their health. They have been instrumental in securing many Federal and state laws for the protection of life and conservation of health. They never urged such legislation as a special favor for themselves, but always for the common good. They have had more struggles with corporations for health and safety conditions of work than they have for wages.

The workers realize with the deepest significance that health is their capital, their chief asset. To lose their health is to lose their power to earn. To keep health or improve health means increasing the power to produce. Wages depend in the last analysis on quantitative production—the greater the production, the greater opportunity is afforded for workers to raise their wage scale.

THE FRUITS OF ORGANIZED LABOR.

The increase and power of organization of workers insures, first, improved health; second, increased production; third, fewer accidents; fourth, shorter hours for fathers and mothers; fifth, higher wages; sixth, better education and health of children; seventh, higher-grade citizens; eighth, employment of a better grade of

certified physicians; ninth, fewer patent medicines, drugs, nostrums, quacks, and whisky.

Let me relate just one illustration from many, gathered during a very busy life. A wealthy mine owner of West Virginia admitted to me in June of this year that, after fighting organizations of his miners for many years, he finally changed his attitude in 1912, and this was the result: Before organization in his field the highest average production was 5.4 tons per man per day of ten hours. Since organization the average output had risen to 9.2 tons per man per day of nine hours. Fifty percent less accidents had happened, no stoppages had occurred, no illicit drunkenness reported, less sickness, 50 percent less labor turn-over, more school houses, finer social conditions, happier neighborhood, a more contented and prosperous boss.

LACK OF VITAL STATISTICS.

If it were possible to secure complete and accurate statistics of men, women, and children in this country whose health is impaired and whose lives are materially shortened by employment under conditions which were preventable by the exercise of intelligence and comparatively small cost, the totals revealed would be far more appalling than the losses during the present war. The losses and sufferings due to preventable ill health tax the imagination. A large part of the country population, and the city population as well, suffer from unnecessary ill health. Good health is an important factor in the production of wealth, let alone the satisfaction of good health to the individual in his life as a consumer. The need of knowledge along health lines is widely attested. Nowhere does ignorance exact heavier penalties.

It has been calculated that out of our normal industrial army of over 38,000,000 workers there are at all times about 3,000,000 incapacitated for full service, and it is further calculated that of this 3,000,000 one-third are from absolutely preventable causes and about one-third more through causes probably controllable.

THE YEARLY TOLL OF PREVENTABLE DISEASE.

One million five hundred thousand persons die in the United States every year, many of the deaths being premature. It is estimated, no doubt too conservatively, that for every death there are two additional persons sick—a total of 3,000,000 sick. Some eminent authorities estimate the economic losses each year in the United States due to sickness range from \$1,500,000,000 to \$2,000,000,000. The greater part of such sickness is preventable. There is no more profitable undertaking than the promotion of health, and no form of knowledge more urgently needed in curricula than effective hygienic science. Tuberculosis might be made as rare as smallpox, but, on the other hand, the death rate is high from the disease, being

183.6 per 100,000 in 1907. Five hundred thousand persons in the United States are suffering from tuberculosis. One-seventh of all deaths are due to it. The economic loss in the United States in 1909 from tuberculosis is estimated at almost 50 percent above the value of the wheat crop of the country.

In 1908 there were 35,000 deaths from typhoid fever and 350,000 cases in the United States. Better local sanitation would have prevented 75 percent of the cases, while sanitation for the country at large would have prevented most of the remaining cases. Whole families in the country are often almost exterminated by typhoid fever developed from infected wells and unsanitary surroundings.

Typhoid has been nearly eliminated in communities where intelligent precautions have been taken. The results of education appear at once in decrease of the death rate from this disease. About 80 percent of the cases of typhoid develop from drinking impure water, a cause easily removed by simple scientific methods.

Pneumonia causes a high death rate—in some cities one-sixth of the number of deaths. Methods of prevention, similar to those for tuberculosis, are well established and would prevent the majority of cases if intelligently employed.

E. E. Rittenhouse, president of the Provident Savings Society of New York, asserts that annually in the United States human lives equaling the population of the state of North Dakota are sacrificed through ignorance and neglect of reasonable and known preventive measures, and that preventable disease and accident yearly destroy more lives than have been lost in all the country's wars since the declaration of independence.

ECONOMIC WASTE OF LIFE AND TIME BY INDUSTRIAL ACCIDENTS.

Fearful losses of life and economic waste result yearly from industrial accidents. Unfortunately we are still in the dark as to the number of industrial accidents, notwithstanding continuous demands by labor and forward-looking employers for definite data from state and Federal authorities. The only accurate data on hand is confined to mining and transportation. For the five-year period ending December, 1917, a total of 16,526 workmen were killed and over 49,000 injured in our mines and quarries. For the five-year period ending December 31, 1917, the railroads of the United States killed 48,801 and injured 931,764. Of the killed and injured more than seven out of eight were railroad employees. It must be remembered that men who work in mines and quarries and on our railroads are picked men. Invariably they are the strongest types.

The extreme prevalence of accidents as shown suggests the need of better knowledge of dangerous employments and risky situations. Not a day passes without its toll of avoidable mishaps, entailing pain, expense, household sorrow, permanent injury, public loss.

Similar accidents are continually being repeated, but adequate warning is too rarely given. Individuals learn by experience of the most expensive kind. Mere prohibitions as usually given are not effective. Were a manual of accidents prepared in the spirit of science and widely distributed, tens of thousands of accidents, with their incidental expense, would be avoided every year.

Hundreds of typical accident situations could be demonstrated in laboratories and lecture rooms, and thus an effective experience be had without the wasteful, needless experience of real accident. It is questionable if people need to learn nearly so much by experience. The purpose of education is to substitute learning by understanding in place of learning by experience.

We hear much of efficiency experts. I know no field which presents greater opportunities for their efforts than that of scientifically surrounding workers with conditions calculated to keep them in condition fit to perform their best service.

THE PROBLEM OF EQUAL INTEREST TO EMPLOYER AND EMPLOYEE.

It is too painfully apparent that this problem of health and safety is of equal interest to employer and employee. An injury to one is the concern of all. It is to the interest of all the people of the country to recognize the fact that it is quite as important for men to be kept in the same state of high efficiency as machinery and other forms of property.

Restriction of output is often justified as necessary in order to preserve the health and vigor of the worker, thereby conserving the human resources of the nation. Energy and ability to produce are the workingman's capital, but it is intangible and is not adequately protected either by statutory law or trade union agreements. Trade unionists know that speeding up beyond definite limits impairs the efficiency of the worker and reduces the total output during his life. From this point of view it is nothing short of robbery to quickly wear out a workingman and impair his capital while only paying him "existence wages." An industry which uses up the vital energy of a worker in a few years is coining the nation's life-blood into dividends. No industry has a right to more than that amount of the worker's energy which can normally be replaced by proper food and rest. It is obviously to the interest of the worker and of society that overdriving and sweating be abolished. The policy of organized labor toward such a consummation is acting for the best interests of all society in a thoroughly praiseworthy manner. Restriction of the output of an individual worker during a given day, week, or year is justified because it increases his total output and allows the worker to become a better citizen and a more desirable member of society. Careful tests should be made by employers and employees in cooperation in order to ascertain the

proper amount of time needed to perform a given job. Systematic investigations of this nature would give definite standards or averages for the output of the average worker.

CONSERVATION OF WORKER'S HEALTH EVOKES SCANT ENTHUSIASM.

Great enthusiasm usually accompanies proposals to conserve natural resources, animal life, and food products. This is, of course, perfectly proper. No criticism is heard as long as the output is limited to save material products from utter annihilation, but, when the health of the worker is at stake, there seems to be little sympathy with any limitation less than that which the capacity of a skilled, subsidized "pacemaker" demonstrates.

The charge of malingering is too thoughtless—the cry of "slack-ers" frequently unfair. Listen, gentlemen and friends of humanity, to this unvarnished report of some workmen's experiences:

"Officers of the Oakland, Cal., Boiler Makers' Union declare that newspaper sensationalism about strikes and high wages in shipyards is 'becoming tiresome.' The publicity committee of this union reports: 'We have made careful estimates, and find that there are only 70 men out of the 15,000 working in Alameda County shipyards who are drawing \$50 a week or over.'

"The average wage paid shipyard workers is \$24 a week. The time limit of endurance for a man working with a pneumatic hammer is six months on general work and three months on the shell. After that he has to take a lay-off and rest. The average length of time for a man to stay with riveting is three years. Then he must seek other work if he doesn't break down altogether. We have many riveters in the hospital now suffering from breakdown.

"We know that the Government wants ships, and we have been willing to waive rules that in ordinary times we have found necessary to protect the lives and health of our members.

"We have waived objection to piece work for the duration of the war, we have waived apprentice rules, we have consented to increasing the number of helpers to each mechanic, and we have worked overtime against our wishes in our desire to aid the Government get more tonnage into the war.

"Despite these conditions we are being daily misrepresented by newspapers that howl 'strike' when we instruct officers to take up with the Government officials the question of health conditions which will prevent physical collapse of our associates."

Without undertaking to enumerate all the efforts by the American labor movement to conserve human welfare, I close this recital by recording some of the many declarations in the labor program for health and safety of the workers and all the people.

THE LABOR PROGRAM FOR HEALTH AND SAFETY.

1. Continued agitation for a shorter work day to a maximum of eight hours for all manual toilers.
2. Demand for a higher minimum wage for all labor.
3. Encouragement of out-door exercise.
4. Formation of fresh air clubs.

5. Recommendation of temperate habits, including a diminution of the use of intoxicants.
6. Release from work at least one full day in seven.
7. Playgrounds for children adjacent to all public schools.
8. Large, open "breathing spaces" or parks interspersed in all cities.
9. Total elimination of the sweatshop system.
10. Rigid inspection and enforcement of law in all mines, mills, factories, and workshops.
11. Saturday half holiday fifty-two weeks in the year.
12. Incorporation in trade agreements or in collective bargains governing working conditions of provisions for suitable ventilation, sanitation, and safety devices.
13. That, wherever possible, the suburban residence idea be strongly favored, coupled with a demand for one-half rates on steam and trolley lines during the usual hours of going to and returning from work.
14. Further agitation for better rooms and fresh air ventilation in all living apartments.
15. A positive demand for the passage and enforcement of rigid antichild labor laws in states where they do not now exist.
16. Abolition of night work by women and minors.
17. Equal pay for equal work, regardless of sex.
18. More conferences and better understanding established among employers, workers, and physicians.
19. Inauguration of community forums, where health conditions can be openly discussed by parents and physicians.
20. Elimination of Latin and substitution of English in prescriptions. This mystifying practice is un-American and does not help practitioner or patient.
21. Continuous medical and dental inspection in all public schools at public expense.
22. Complete systems of up-to-date physical education in all public schools at public expense, with further provision for free examination of adults by medical faculty of schools.
23. Concentration of all Federal health agencies into one department, with a secretary at its head, he to be a member of the President's cabinet.

THE TREATMENT OF INTRANASAL AND ACCESSORY SINUS DISEASES.*

By OTTO J. STEIN, M.D., Chicago.

In order to attain the maximum results from any form of local treatment, consideration should always be given to the general physical condition and environment of the patient. Occupation as well as habits, and the conditions under which these take place, are big factors in the production and the cause of the continuation of nasal symptoms. These must be recognized and corrected. Such symptoms as hyperacidity, acidosis, indican excess, constipation, diarrhea, foul breath, eructations, glycosuria, albumen, anemia, chlorosis, jaundice, menstrual disorders, persistent fevers, intermittent pains, and many others must be reckoned with as helping to point out the way to relieve the nasal manifestations. The dyspnea present in polyp and sinus cases is also complained of in renal and cardiac disease. I have repeatedly seen nasal symptoms, of long standing, disappear after recognizing the presence of diseased tonsils and removing them, as also after correcting some existing stomach or intestinal abnormality. We all are fully informed with the knowledge that systemic diseases like typhoid, syphilis, and tuberculosis give rise to nasal symptoms, but still some of us are apt to overlook this fact and neglect to treat the case with this in view.

The limited time available for the presentation of this subject will necessitate my centering all further argument on the local treatment. Whatever form of local treatment is employed, it should place the nose and its accessories in as nearly a normally ideal condition as possible. This appertains both to structural relationship and integrity of soft tissue. Such a nose I look upon as having a relatively straight and thin septum, free from ridges and spurs that either occlude or produce pressure; turbinates hanging free—that is to say, not in contact with the septum or the outer wall of nasal cavity or the neighboring turbinates, also not enlarged, obstructing, or diseased; ostea unobstructed; sinuses clean and clear, and a soft tissue over all that contains the requisite kind of nerves, blood vessels, and lymph system to carry on its physiological requirements. This is often possible to do and at times impossible.

It is comparatively easy for some operators to remove a part or even all of the interior of a nose, but a difficult matter to do so

*Read before the Sixty-eighth Annual Meeting of the Illinois State Medical Society, held at Springfield, Ill., May 21-23, 1918.

and leave it in a condition of physiological effectiveness. The healed areas seldom offer a surface satisfactory to these requirements.

Much has been written and said about the "indications" for operative interference, and every degree of obstruction, redundancy, and irregularity, as well as every variety of pathology, have come up for honorable mention and "among those present." Many an operator has in mind only the "drainage and ventilation" idea, to the exclusion of a normal lining membrane, and, by his operative propensities, substitutes new symptoms for the ones complained of first. Whereas the patient before his operations (and it is the plural in many cases) complained of pain, nasal obstruction, or hypersecretion, he now has excessively dry nostrils, large slugs, fetor, epistaxis, anosmia, pharyngitis sicca, cough, aphonia, impaired speech and hearing. The pathology present before such an operation in an exceptional case may warrant even such results, but there is no argument that will satisfactorily excuse the occasion of such a train of symptoms when other methods could have been instituted with all reasonable relief.

Among such other methods I place the suction treatment in the foreground. By its aid one can successfully drain out secretions from the sinus and eustachian tube, creating a drainage and ventilation that will relieve pain and retention, and thereby prevent complications arising, and at times obviating the necessity for operation. I use this form of treatment very much, and believe it is based on more rational principles than that of probing and irrigating. It is my belief that the often repeated irrigation of nasal sinus, as well as the ear, is fraught with great injury. From such use infected material may be forced into neighboring parts, or the membrane become devitalized or exuberant granulations form. It is entirely correct to enlarge the ostium or make a counter opening, when necessary, to allow heavy inspissated secretions or masses of cholesteatoma, polypi, etc., to escape; but, once thoroughly rid of these, irrigations may be dispensed with and a suction procedure employed to cleanse the surface membrane for the reception of the medicament selected for topical application.

When spray or irrigation fluids are used, they should be mildly alkaline and used warm, avoiding all liquid that causes pain or irritation, like smarting, sneezing, lachrymation, and a feeling of tension across the bridge of the nose and brow; with the exception where a highly stimulating effect is desired, as in the treatment of atrophic rhinitis. My choice for many years has been a solution containing sodium bicarbonate and baborate, $2\frac{1}{2}$ grains each in glycerine, 20 drops, and water, 1 ounce. The neglect to utilize the possibilities afforded by the lymphatics, as internal drains, is to deprive your patient of a very valuable aid in therapeutics. A gentle and systematic massage of the soft tissues will accomplish

more than many a surgical procedure, as is well testified to in that type of nasopharyngeal engorgement that contributes to middle ear changes. This manner of treatment is also of considerable value in asthma. Lack of time prohibits but the mere mentioning of the vaccines. Personally I now use them seldom.

In all operations within the nose, greater respect should be shown the mucous membrane than is practiced by some operators. Elevation of membrane, with removal of diseased or obstructing bone beneath, should be the rule and not an exception. A more general conservation of the soft parts will lead to better ultimate results. No one any more removes a ridge from the septum without elevating and preserving its overlying membrane. Ethmoid cells can be entered and cleaned out without removing the middle turbinate. The sphenoid can be entered in the same way. The maxillary sinus can be widely and permanently exposed without subjecting the lower turbinate to an excision.

Because the meatus anteriores and the choanae posteriores present a much less area, as compared with all other parts between these two places, the slightest obstruction here will greatly interfere with nasal function, and hence it is at such places that the greatest relief is obtained by a minimum of correction.

Some of the untoward results following operations can be avoided by slight change in technic. For instance, in submucous septal work an incision in the skin at the vestibule in place of the usual one at the mucocutaneous margin obviates the annoying scabbing often complained of. Also a less extensive removal of bone and cartilage in septal work does away with that very discomforting symptom of "flapping." I believe that one of the refining niceties that has evolved out of the original submucous operation is the removal of only that much bone and cartilage that will permit the replacement of the remainder in a perfectly perpendicular position with no obstruction whatsoever.

The entire removal of a lower turbinate body is seldom, if ever, permissible. The middle turbinate is far too often removed. Substitute methods for its removal may be satisfactorily found in infraction procedures, and in the crushing of cystic turbinates, and in the submucous excision. A great many operations performed upon turbinates could be obviated by "lining up the septum," in getting rid of the bends and irregularities. This can best be done by elevation of the soft tissue and excision of the greatly thickened and deflected portions. Just enough bone and cartilage should be removed to permit the remaining septum to take the proper perpendicular position, and thereby providing for freedom of contact with the neighboring turbinates. An entire nostril full of mucous polypi can be cleared by simply irrigating and ventilating the neighboring sinuses where these are at fault. The electro-

cautery has a very limited value, I believe, and then only on the lower half of the inferior turbinate. In septal ulceration causing epistaxis the submucous elevation is preferable. With the large quantity of radium now at our service there should not be the necessity for the extensive procedures formerly employed in the commonly called "inoperable cases."

Operation in acute nasal disorders should generally be discouraged. Fatalities have frequently occurred. Complications, such as meningitis, brain abscess, otitis, mastoiditis, sinusitis, septicemia, pneumonia, and erysipelas, occur in the presence of acute nasal diseases when operated upon intranasally far oftener than when properly treated otherwise. After the acute symptoms subside, operative measures, if indicated, may be undertaken. I cannot agree at all in the advice given by some that, in the presence of a meningitis of supposed or proved nasal origin, a thorough exposure of the affected meninges through the nose should be undertaken surgically when there exists an actively acute process intranasally, with the exception of opening and draining a presenting abscess. The supposed meningitis may be only a meningeal irritation or meningismus, and in such circumstances surgery would be an unpardonable interference.

77 East Washington Street.

ON A CERTAIN DISADVANTAGE IN THE USE OF GLUTEN FLOUR IN DIABETES.

By JACOB ROSENBLOOM, M.D., PH.D.

Janney¹ has shown that the glucose yielded in the metabolism of protein was directly proportional to the amount of glucogenetic aminoacids contained in each individual protein. The following table shows the quantity of glucose yielded by various proteins:

Protein.	Glucose yield in percentage.
Casein.	48
Ovalbumin.	54
Serum.	55
Gelatin.	65
Fibrin.	53
Edestin.	65
Wheat gliadin.	80
Corn zein.	53

It is readily seen from this table that the wheat proteins are by far the greater source of glucose, while, on the other hand, the protein of milk is by far the lowest. This factor is of great importance on account of the great amount of sugar that may arise from the use of gluten flour in diabetes because of its high protein contents and the high sugar values of the protein contained in wheat. For this reason I think it is important, in selecting a bread substitute, not to use a flour made from *wheat*, but in preference a flour made from *milk* protein, such as Lister's diabetic flour and casoid flour, both of which are made from casein.

Jenkins Arcade.

¹Janney (Arch. Int. Med., 1916, XVIII, p. 584; Jour. Biol. Chem., 1915, XX, p. 21; XXII, 203; XXIII, 77).

CURRENT NOTES

Pneumococcus Arthritis—Vaccine Treatment—Recovery.

The following case is of interest, first, because its commencement was very unusual—there had been no previous illness, nor was any focus of infection found; second, the method of treatment led to prompt recovery.

The patient, a middle-aged woman, was seized with pain in right knee; there was no history of injury or previous illness, and the condition was treated as a simple synovitis. The condition, however, did not subside, and a further diagnosis of rheumatoid arthritis was made and treatment carried out. No improvement took place, and gradually other joints were implicated. After several months' futile treatment she came under my care. At this time patient was utterly helpless and unable to move; even the upper extremities could be moved only with great pain. She was in a state of profound sepsis, with typical septic temperature, skin a pale earthy color, and marked anemia of mucous membranes. Practically all joints were involved, the most marked changes being in knees, ankles, wrists, and shoulder joints. The phalangeal joints were swollen, painful, and spindled-shaped. No reddening of any joints. Knee joints distended with fluid; appetite poor.

I advised aspiration of knee joint for diagnostic purposes. This was done and a bacteriological examination made of the fluid, this latter being a thick turbid material, grayish-yellow in appearance. On culture this showed a mixed infection of pneumococci and streptococci. A vaccine was made and treatment begun. She was kept in bed, given the maximum of fresh air, her bed being moved out on to a balcony when the weather was suitable. Her improvement as soon as vaccine was started was remarkable. Temperature steadily decreased, appetite returned, skin and blood condition improved, and pain abated. As soon as temperature became normal, gentle massage of limbs was commenced, but joints were left severely alone at first. Later the latter were rubbed and moved. Progress was uninterrupted, and from an apparently dying woman she was restored to her former health, and at the present time it is impossible to realize that she had ever been so ill. She has free movement in all her limbs and can close her hands with ease.

The majority of pneumococcus arthritis cases are surgical and often one or two joints are affected. Surgical treatment in this case with a multiplicity of joints affected, even if successful, would have been very tedious, and much disuse of joints would have ensued. The termination of this case with its perfect recovery emphasizes the necessity of having the joint fluid examined in every case of multiple arthritis when practicable. I can find no record of any case treated with a vaccine with such a pleasing result.—Campbell Horsfall, *The Lancet*, Oct. 26, 1918.

Influenza Vaccine.

At a conference on preventive vaccination for influenza held at the War Office, London, on October 14, the following were present: Colonel Sir William Leishman, K.C.M.G., C.B., F.R.S., K.H.P., in the chair; Deputy Surgeon-General P. W. Bassett-Smith, C.B., C.M.G., R.N.; Lieutenant-Colonel D. Harvey, C.M.G.,

R.A.M.C., officer in charge, Vaccine Department, Royal Army Medical College; Major F. W. Andrewes, F.R.S., R. A. M. C. (T.), pathologist, St. Bartholomew's Hospital; Captain S. R. Douglas, late I.M.S., Inoculation Department, St. Mary's Hospital; Dr. J. W. H. Eyre, Director of the Bacteriological Department, Guy's Hospital. Professor W. Bulloch, F.R.S., pathologist, the London Hospital, was unable to attend. The conference reached the following conclusions:

1. After discussing the available evidence as to the bacteriology of the present epidemic, the majority of those present were agreed that there was considerable doubt as to the primary etiological significance of the *Bacillus influenzae* of Pfeiffer, and considered that the existence of some as yet undiscovered virus must be regarded as possible. They had, however, no doubts as to the very frequent presence of Pfeiffer's organism in this epidemic, nor as to the great importance of the part which it played in the production of the symptoms and complications of the disease. The organisms most frequently associated with *B. influenzae*, and, in their opinion, chiefly responsible for the gravity of the secondary pulmonary complications, are pneumococci and streptococci.

2. The general question of the employment of a bacterial vaccine for the control of the incidence and severity of the epidemic was discussed, and it was unanimously agreed that inoculations with a suitable vaccine might be expected to be of value in both directions.

3. The appropriate constitution of such a vaccine was then thoroughly discussed in the light both of the personal experience of the members of the conference and of the information available from medical literature. It was agreed that only the three following organisms should be employed: the *Bacillus influenzae*, the pneumococcus, and the streptococcus. In each instance it was decided that a number of different strains and types of each organism should be utilized in the preparation of the vaccine, and that these strains should been recently isolated from cases occurring during the present epidemic and should be submitted to strict tests as to race and type prior to use.

4. The relative proportions of the different organisms and the dosage of the vaccine were then dealt with, and it was agreed that the following should be its constitution and dosage:

	1st dose.	2nd dose.
<i>B. influenzae</i>	30 millions	60 millions
Pneumococcus.....	100 millions	200 millions
Streptococcus.	40 millions	80 millions

The vaccine should be sterilized by a temperature of 55° C., maintained for half an hour, and 0.5 percent of carbolic acid should subsequently be added as an antiseptic.

5. Whenever possible, both doses of the vaccine should be given at an interval of 10 days. It was thought that the reactions to be expected from this vaccine would, in the majority of cases, be either trivial or nonexistent. It was, however, considered to be of great importance that, in the case of soldiers, a period of 24 to 36 hours' light duty should always be given.

6. As regards the conditions under which this prophylactic vaccine should be employed, the conference was unanimous in considering that, while it would be preferable to carry out the inoculations before exposure to infection, there do not exist any adequate grounds for withholding it in the case of a body of men among whom influenza had already appeared, provided that care was taken not to inoculate any individuals who have fever or are obviously ill, or those who are at the time suffering from catarrh. At the same time a careful watch should be kept for any evidence of a period of increased susceptibility following on inoculation, and, should this become manifest, it is advised that instructions be given to lower the doses recommended above.

7. The conference made the following recommendations as to dosage of the vaccine in the special cases mentioned below:

(a) *Children*.—It is not advisable to inoculate children under the age of 3. For older children the following doses may be given:

From 3-7 years, $\frac{1}{4}$ of the full dose, as detailed in paragraph 4.

From 7-16 years, $\frac{1}{2}$ of the full dose, as detailed in paragraph 4.

Above 16 years, the full dose, as detailed in paragraph 4.

(b) *Colonial Troops*.—In this case they recommend three doses at intervals of 10 days, as follows:

1st dose, $\frac{1}{2}$ of the "first dose," as detailed in paragraph 4.

2nd dose, the "first dose," as detailed in paragraph 4.

3rd dose, the "second dose," as detailed in paragraph 4.

(c) *Native Contingents*.—Here, too, they recommend three doses at intervals of 10 days, as follows:

1st dose, the "first dose," as detailed in paragraph 4.

2nd dose, the "second dose," as detailed in paragraph 4.

3rd dose, the "second dose," as detailed in paragraph 4.

8. The conference then discussed at length the question of employing the vaccine for the treatment of severe cases of influenza and its complications. On this they make the following recommendations:

(a) The vaccine is most likely to be of service in the treatment of subacute and of chronic cases; in this class of case the initial dose which they recommend is $\frac{1}{5}$ of the "first dose," as detailed in paragraph 4.

(b) The use of vaccine in the treatment of severe cases of secondary bronchopneumonia cannot at present be recommended, in view of the dangerous rapidity and severity of many of these cases. Should it, however, be desired to try the vaccine in such cases, it is advised that the initial dose should not exceed $\frac{1}{20}$ of the "first dose," as detailed in paragraph 4.

9. A profitable discussion then followed on technical details and on the investigations bearing on the subject which were felt to be desirable and likely to lead to practical improvements in respect of the employment of vaccine. These hardly admit of summary, but it was agreed that among the most important were the questions of the unity or multiplicity of types of the *B. influenzae* and of the identification of this organism, and some arrangements were made between the members for exchange and collection of cultures, which it was hoped would lead to progress in these directions.

10. The committee then considered the practical steps to be taken for the preparation of the vaccine on the assumption that considerable demands might be made for it at an early date. Thanks to the generous assistance offered by the members of the conference, this was placed on a satisfactory basis, it being agreed that the numerous strains of the organisms which were in possession of most of the members, and which had been obtained from recent cases, should be sent to Captain Douglas, at St. Mary's Hospital, where he has kindly consented to put them through the necessary tests as to purity, type, etc. Those selected will then be passed on to Lieutenant-Colonel Harvey at the R. A. M. College, who will arrange for the preparation of the vaccine for army purposes, and also to Deputy Surgeon-General Bassett-Smith at the Royal Naval College.

11. In order to ascertain the degree of protection given by the vaccine, the conference recommend strongly that the necessary administrative steps be taken to secure statistical records dealing with the following matters:

(a) The reactions following the inoculations.

(b) The occurrence of any cases of severe illness within 48 hours of inoculation.

(c) The incidence of the disease among the inoculated and uninoculated.

(d) The incidence of complications among the inoculated and uninoculated.

The Standardization of the Wassermann Reaction.

The following is a full abstract of the paper by d'Este Emery referred to in our editorial columns, which was published in *The Lancet* of October 26 last.

1. PREPARATION OF THE HEMOLYTIC SYSTEM.

d'Este Emery uses a 5-percent emulsion of sheep's corpuscles, the amount being measured by sucking up the required quantity in a graduated pipette. He does not centrifugalize to constant volume in a graduated tube, since the mass of corpuscles thus obtained is sometimes very difficult to stir into a uniform emulsion, and may show a considerable amount of hemolysis when emulsified. Moreover, the matter is not really an important one so long as the deviation from the 5-percent aimed at is not great; the whole process, including the standardization of the complement, is carried out with the same emulsion, and any trifling error is unimportant. It is highly advisable to prepare all the sensitized emulsion that will be required for the day at once, otherwise a small error may creep in.

The Dose of Amboceptor.—The amboceptor is standardized in presence of the same amount of complement as is used in the test ($2\frac{1}{2}$ units per c.cm.) in the following manner: knowing from previous experience, or from testing out with a previously studied batch of amboceptor serum, the approximate amount of serum required to sensitize 20 c.cm. of 5-percent emulsion of corpuscles, the strength of complement is estimated—i. e., by taking a 1 in 25 dilution of the serum, measuring out 2/20, 3/20, 4/20, etc., of a c.cm. and making up to 1 c.cm. with saline. To these tubes are added $\frac{1}{2}$ c.cm. of the sensitized emulsion and the mixtures are incubated for half an hour. If necessary, a second estimation is made, using double amount of a 1 in 50 dilution. This gives a unit of complement in relation to the emulsion of corpuscles used in estimating it.

The new amboceptor is now in its turn estimated, using the same strength of complement as is used in the test proper—that is, $2\frac{1}{2}$ units—as already determined. To do this a solution is prepared containing 5 units of complement in 1 c.cm., and a series of tubes put up, each containing $\frac{1}{2}$ c.cm. To these are added various dilutions of the amboceptor to be tested, and then $\frac{1}{2}$ c.cm. of 5-percent emulsion of corpuscles, and the mixture incubated as before.

	c.cm.	c.cm.	c.cm.	c.cm.	c.cm.	c.cm.	c.cm.	c.cm.
Complement*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Amboceptor†	1/100	1/1000	1/10,000	1/1200	1/1400	1/1600	1/1800	1/2000
Hemolysis	Complete		Trace	Complete			Practically complete	
			*2.5 units.	†0.5 c.cm.				

Thus, each $\frac{1}{2}$ c.cm. of amboceptor contains about 2,000 hemolytic units, or each c.cm. contains 4,000 units—the units being estimated for $2\frac{1}{2}$ units of complement per c.cm.

In actual practice 40 of these amboceptor units per c.cm. are used. Where such a large excess is used, small variations in the amount taken do not affect the result.

Where still greater accuracy is required, the complement may be again standardized by means of the new unit of amboceptor thus obtained, and the latter restandardized by means of the new unit of complement, and thus by a series of approximations very accurate figures may be obtained. It is necessary to emphasize the fact, however, that these are not fixed units—they are only relative the one to the other—and, if it were necessary to make a complete fresh start, there would be no means of getting the same standard as before. Fortunately amboceptor serum varies but slowly, and owing to this fact the

units used in any given laboratory maintaining a standard technic vary but slightly from time to time.

Having calculated the amount of amboceptor serum required, the necessary amount of corpuscles is placed in a graduate containing a little less than the required amount of saline, the serum is added and well stirred in, and the volume made up to the required total. Thus, to make 40 c.cm., take about 35 c.cm. of saline, add 2 c.cm. of corpuscles, 4/10 c.cm. of amboceptor (having the strength given above), and stir well; then make up to 40 c.cm. exactly. This is allowed to stand a little.

2. STANDARDIZATION OF THE COMPLEMENT.

Prepare a 1 in 25 solution of the guinea-pig's serum, and place 2/20-3/20, 4/20, etc., of this dilution in a series of tubes as before, make up to 1 c.cm. in all cases, and add $\frac{1}{2}$ c.cm. of the sensitized emulsion. Incubate, and read off in half an hour, holding the tubes against a dark background and looking at them by transmitted light. This is the most difficult part of the process if really accurate results are required, though it is not easy to go so far wrong as to give results which shall have any incorrect clinical significance. Greater accuracy may be obtained by using a dilution of 1 in 50, and a useful device is to allow the tubes to settle for an hour or so, so as to be able to compare the upper part of the tube, which will now in any case be clear owing to the subsidence of the undissolved corpuscles, with the lower part, and thus to see whether there is or is not a trace of undissolved corpuscle.

3. PREPARATION OF THE ANTIGEN-COMPLEMENT MIXTURE.

d'Este Emery makes up the mixture so that the necessary $2\frac{1}{2}$ units of complement and the requisite amount of antigen are dissolved in 0.9 c.cm. and not in 1 c.cm., as in their method. In all cases the volume of the fluid to be tested, whatever it may be, is 1 c.cm. exactly, this being the amount used in the standardization. The calculation is made just as if to make up the amounts in 1 c.cm., but they are actually dissolved in 9/10 of the amount. Thus, to make nominally 50 c.cm. of mixed antigen-complement, supposing the amount of antigen required to be 4 percent and the complement to have a minimal hemolytic dose of 5/20 c.cm. of a 1 in 25 solution, I proceed as follows. The amount of guinea-pig serum required is

$$5/20 \times 1/25 \times 2\frac{1}{2} \times 50 \text{ or } 1.25 \text{ c.cm.}$$

Two questions now arise for discussion.

1. Is there any advantage in standardizing the complement in presence of the antigen? There is only this advantage: that you are enabled to state at once, and without calculation, what is the actual amount of complement you are using in the test. The fluid prepared as above with a given antigen, and calculated to contain $2\frac{1}{2}$ units of complement per 0.9 c.cm., actually contains 2 units, and this is the amount used, therefore, in the test.

2. Is there any advantage in mixing the complement and antigen (both prepared of double strength) just before the test, and not making up a large volume of the test-fluid for use throughout the series of test? d'Este Emery does not find that there is any continued absorption of complement for the first two hours at least after the two fluids are mixed. There is a very rapid absorption of the amount stated, but after that the composition of the fluid remains constant for a considerable time.

4. THE ACTUAL TEST.

The preparation of the sera follows on usual lines and needs no comment. They are placed, each tube carefully numbered, in a tray of plasticine, with

a blank space at the left-hand end. Into the row just in front of the row of a Wassermann rack in which the holes are numbered 1, 2, 3, etc., is placed a series of tubes into each of which 0.9 c.cm. of antigen-complement mixture is pipetted. The first serum tube is taken out of the plasticine and 0.1 c.cm. withdrawn by means of a fine-pointed capillary pipette. This is washed out into the mixture in the tube, which is then placed in the hole just behind it, numbered 1, and the serum tube is placed in the blank space at the left, so as to leave an empty space between it and tube 2. The pipette is then washed out with saline and the process repeated, so that each serum tube is gradually shifted one place to the left, and each complement-antigen tube is moved one row back. By this method is reduced to a minimum the possibility of mixing the tubes; and this is one of the chief errors of the Wassermann reaction, and will continue so long as human nature remains fallible and large batches are in vogue.

When the rack is filled in it is placed at once in the water-bath and incubated for 20 minutes. Then $\frac{1}{2}$ c.cm. of sensitized corpuscle emulsion is added to each tube brusquely, and the rack returned to the incubator.

No controls are put up in the first instance, since it is unnecessary in the case of a negative serum; the only purpose that can be achieved by a control is the detection of anticomplementary substances in the serum, and, if full hemolysis takes place, these are not present in excessive amounts. Where there is a positive result, and especially a partial positive, controls are necessary. For these use $1\frac{1}{4}$ or $1\frac{1}{2}$ units of complement per c.cm. in saline, again making up the solution in $\frac{9}{10}$ of the calculated amount. These amounts leave approximately one free unit of complement when 0.9 c.cm. is mixed with 0.1 c.cm. of most sera, and should therefore give complete, or almost complete, hemolysis.

5. THE QUANTITATIVE TEST.

This is carried out as follows: Taking a series of 6 tubes, place 0.9 c.cm. of complement-antigen mixture in the first and 0.5 in each of the remainder. To the first tube add 0.1 c.cm. of the serum to be tested; this is pipetted carefully to the bottom of the fluid, so that it does not mix therewith at present, and the pipette washed out in the supernatant fluid. Then, with a pipette showing 0.5 c.cm. mix the two fluids quickly and remove 0.5 c.cm., which is immediately carried over into the second tube and mixed in. This operation is repeated until the last tube, when the last $\frac{1}{2}$ c.cm. is rejected. The whole process is very quickly carried out, and gives a series of six tubes containing 0.5 c.cm. of fluid each, the first containing $\frac{1}{20}$ c.cm. of serum, the second $\frac{1}{40}$, and so on to the last, which contains $\frac{1}{640}$ c.cm. (These figures would have to be doubled to be comparable with the qualitative test, which was given as if carried out in 1 c.cm. of total bulk.) It is rarely necessary to go beyond the sixth tube, but exceptionally a specimen may be found which is even stronger than this and gives partial deviation when $\frac{1}{640}$ c.cm. of serum is present in 1 c.cm. of complement-antigen mixture.

The results are stated as in McIntosh and Fildes' method, calling complete inhibition (no hemolysis), 4; nearly complete inhibition (a trace of hemolysis), 3; hemolysis of approximately half the corpuscles, 2; nearly complete hemolysis, 1. Thus, a result stated as 4 4 4 2 0 0 would indicate that $\frac{1}{40}$ c.cm. of serum made up to 1 c.cm. with complement-antigen mixture would give complete inhibition, whilst a mixture of $\frac{1}{80}$ c.cm. of serum made up to 1 c.cm. would leave enough complement free to hemolyze about half the corpuscles.

We can, with no great degree of error, state our results in terms of the number of units of complement absorbed: thus, the result given above might be taken as indicating that $\frac{1}{40}$ c.cm. of serum absorbed 2 units, or that 1 c.cm. would absorb 80 units. We may also read them off approximately in

terms of "standard units": thus 400000 is equal to 1 unit, 440000 to 2, 444000 to 4, and so on. There are, however, some corrections which have to be made before regarding this as a scientifically accurate, though it is a fairly close approximation.

STANDARDIZATION OF ANTIGEN.

Let us now revert to the main object of the inquiry, and see what fixed point we can find to act as a starting-point for the standardization of our methods. The first and most obvious suggestion is the antigen. Would it not be practicable to have a standard antigen, issued by authority, which all workers might use, and thus obtain concordant results? Antigen is fairly constant (to say the least), and presents at any rate some approximation to a definite chemical substance.

The first question that arises is this: If we prepare antigens from similar materials by identical processes, will they be *equal*, or *approximately equal*, in action? d'Este Emery has carried out a good many experiments on these lines, and finds that this is the case.¹

For example, three antigens were prepared with 10 percent of sheep's heart in absolute alcohol (10 gms. of heart muscle with 90 c.cm. of absolute alcohol) and compared for their antigenic property. Mixtures were made of these three antigens with the same sample of 1-percent alcoholic cholesterin, and 4-percent dilutions were made with the necessary amount of complement, the same, of course, in all cases. Quantitative tests were then made with the same batch of syphilitic serum, and the results were found to be exactly the same; thus, in one experiment the serum (a very strong one) gave 44444430 with each sample of antigen, and, when the seventh tube in each series (carefully selected so as to be of uniform width) was centrifugalized and the supernatant fluid compared with its fellows, no appreciable difference could be detected.

These experiments have been frequently repeated, and as far as sheep's heart is concerned there is doubt that an almost absolutely constant antigen can be prepared in this way. (Fresh, not frozen, heart *must* be used.) There is one proviso—the solution of the active ingredient or ingredients is somewhat slow; it takes at least a week for the antigen to get to its full strength, and it is better to leave it 10 days before use. Careful comparisons have been made between two batches of antigen prepared from the same sheep's heart, the one part simply cut up into small pieces, the other minced fine and ground up with quartz sand, and then shaken for some hours; the latter attains its full strength more quickly, but the ultimate result is the same in the two.

In actual practice are used three extracts prepared from three hearts. They are kept separate, and 1 c.cm. of each is taken, to which is added 2 c.cm. of cholesterin.

Secondly, as to the *keeping power* of the antigen. Strictly speaking, we cannot determine this, for we can determine the antigenic power of an antigen only by reference to a syphilitic serum, and we have as yet no assurance that this will remain sufficiently constant for our purpose. We can overcome the difficulty in this way: if we prepare several antigens at different times—say, a month apart—and compare them from time to time, using them as antigens with syphilitic serum—any serum—then, if they remain constant, the results ought to be the same in all cases. This is what actually happens:

Thus, antigen B was prepared on August 24, 1917, and was therefore one month old at the time of the first test. Antigen C was prepared on Sept. 20, 1917, and so was four days old. They were compared with serums X and Y on September 24, 1917. X gave 444442 with antigen B and 444442 with antigen C, but on careful examination there was a minute trace of hemolysis

¹This has already been stated by McIntosh and Fildes (Brain, XXXVI, Part II).

more in the last tube with antigen C; the amount was only just perceptible, and may have been due to the fact that full solution had not yet occurred. Y gave 4 4 4 4 4 1 with antigen B and 4 4 4 4 4 1 with antigen C. Here, again, the same minute difference could be detected on careful examination.

The test was repeated on September 25 with the same sera. X gave 4 4 4 4 4 2 and 4 4 4 4 4 2 with the two antigens, no difference being perceptible in the last tubes, and Y gave 4 4 4 4 4 2 in both cases, there being a minute difference in the last tubes.

It was repeated again on October 1. Serum X gave 4 4 4 4 4 2 with both antigens, but there was a minute difference in the last tubes; the same with Y.

The result of these preliminary experiments was to show that the antigenic power of the two antigens was practically identical, C being, if anything, a shade weaker than B, but the difference was extremely minute—it was hardly too large to be the result of experimental error, but it ran fairly constantly throughout the early part of the series, which was as a matter of fact larger than those I have published. Tests throughout November and December showed that both antigens had attained exactly the same strength.

They were tested again with other sera at intervals, and another antigen, D, was added to the series on December 1, 1917. This was found after a fortnight to have exactly the same strength as the other antigens, and on a standardization on January 15 all three antigens gave exactly the same readings with every serum with which they were tested, three in number. Thus, the last test (July 29, 1918) was carried out with a comparatively weak serum, which gave 4 3 0 0 0 0 with each antigen, and, when the tubes showing partial hemolysis were centrifugalized and compared, not the minutest difference could be seen between them.

Thus we find that three antigens prepared by identical methods from similar materials gave identical results when tested for their antigenic power within a fortnight after being made, and at intervals of ten months in the case of two of them and seven months for the other. The anticomplementary power (which is much less important) was also tested, and was found to be constant.

The author always kept antigen on the magma of heart from which it has been extracted. He has had sudden changes on many occasions in antigens which had been pipetted or filtered from the deposit, but never in one that has been kept in contact therewith.

This fact appears to constitute an excellent starting-point for the standardization of the Wassermann reaction; and so, within limits, it is. It will enable us to fix a constant unit for the reaction, one which can be reproduced at any time by anyone if the official standard is lost. As a tentative unit is suggested *the strength of serum which will just give complete absorption of two units of complement when 1/10 c.cm. of the serum is incubated with 9/10 c.cm. of 4-percent antigen, prepared in the way described.* This is an excellent clinical standard. "I have had experience of its use in some thousands of cases, and with one or two exceptions (in none of which could the presence of syphilis be excluded absolutely) I have never found a positive reaction, using this standard, in a nonsyphilitic case." Whether it can be made a little delicate (say, by lowering the amount of complement to 1.75 or 1.5) remains for future investigation.

But further consideration will show that the use of a standard antigen, though of great value, does not help us very much when we have to deal with serologists all over the country making Wassermann tests by very different methods. For if a worker uses the antigen in different strengths or in different proportions, he will have to test out this standard antigen for himself, and he might just as well make it in the first instance. Again, it does not meet the indication of providing a fixed unit to which all results, by whatever method

they are obtained, can be compared. For instance, a standard antigen such as described would be quite useless to anyone following Browning's technic, and any results obtained by him would still remain a sealed book to anyone who was used to other processes.

STANDARDIZATION OF SERUM.

We turn, therefore, to the third ingredient of the first stage of the reaction—the serum. If it were possible to prepare a standard serum of constant strength, the problem would be solved. This would be of use in two ways.

In the first place, by using it as a control, worked out quantitatively in every batch of tests, it would be obvious if at any time the conditions altered and the results were not in series with those that had gone before. For example, if the standard serum gave a reaction of 444000 on previous occasions, and then gave only 440000, it would be obvious that something was wrong—probably either the complement had been estimated too high or the antigen had lost potency. The experimenter might then either recalculate his results on this basis or, preferably, scrap them and test them out again. A standard control serum is now used by d'Este Emery constantly for this purpose.

In the second place, the serum could be used for any method of testing and the results stated in absolute units. For example, suppose we take the unit suggested provisionally, and we have to deal with a serum giving 444000. This will be of about 4 units strength, since each 4 represents a serum of half the strength of its left-hand neighbor. When the serum is tested quantitatively by another method, it might give a result which the experimenter might choose to express by saying that under the conditions of his experiment it had absorbed 12 units of complement. In this case each of his units would be equivalent to 3 standard units and might be so expressed, so that his report would read “positive, absorbing 12 units of complement, equal to 4 standard units.” As a check on his method and to see whether his positives and negatives came out correctly, it would only be necessary to do one full quantitative test—that one the control serum.

CONSTANCY OF THE SERUM.

The first question that presents itself is this: Does the serum remain constant for a length of time sufficiently long to allow it to be used in this way in practice? I shall show that it does.

The sera used in these observations were collected from syphilitics as a part of the intravenous injection of salvarsan products, and the greatest care was used in securing absolute asepsis. The specimens were collected in test tubes, and after complete separation had occurred the serum was pipetted into a second tube until complete subsidence of the corpuscles had taken place or it was centrifugalized. It was then pipetted into sterile glass ampoules, white for choice, and the tips sealed, care being taken that no serum remained in the tip to become charred during the sealing. It was then heated to 58° C. for fifteen minutes.

The first series of experiments dealt with samples of the same batch of sera kept: (1) at the room temperature, (2) in the ice chest, and (3) frozen solid in ice and salt. Two sera, both from untreated secondary cases, were used, and each was tested with two antigens. One serum (176) gave 444420 with each antigen and the other (180) gave 444442. (There was a minute difference between the results with the same serum and the two antigens, due to the latter not being of exactly the same strength; this was very small, and apart from it all the readings were identical within the limits of experimental error.) This was on September 21, 1917, the sera having been collected on September 18 and September 20 respectively. They were retested with the

same results on September 25, October 1 and October 16. The experiment had then to be discontinued, owing to the stock of serum running low.

This experiment showed clearly that the change, if it took place at all, was very slow, and, further, that there is no advantage in keeping the serum in the ice chest, or frozen, at any rate for a period up to three or four weeks. This is a great practical advantage.

"I have now ample evidence that syphilitic serum, collected aseptically and free from corpuscles, will keep for at least a month without appreciable alteration. If kept indefinitely, it does fall off gradually. The following are figures of five sera which have been kept for considerable periods of time.

	207	208	209	212	233
December 12.....	444420	443000	442000	430000	
December 19.....	444420	442000	441000	420000	
January 4.....	444430	442000	442000	430000	
January 11.....	444430	442000	442000	430000	443000
January 18.....	444430	442000	442000	430000	443000
January 29.....	444420	443000	442000	420000	442000
February 5.....	444430	443000	443000	100000	441000
March 19.....	444430	443000	442000	100000	441000

These observations were carried out, without any extraordinary precautions as to accuracy, as a part of the routine Wassermann examinations, which may account for the occasional discrepancy in the last significant figures. Here it will be seen that serum 212 (which was a weak one to start with) fell off nearly to nothing during the experiment while the others remained practically constant. A falling off of from 444440 to 444400 represents a diminution eight times as great as one from 440000 to 400000.

THE QUESTION OF ANTICOMPLEMENT.

"Serologists to whom I have quoted my figures have objected that they were obviously impossible, since the serum *must* get stronger from the development of anticomplement. I need hardly point out that the usual teaching is that serum begins to get anticomplementary within a few days after collection, and that this property of bringing about nonspecific destruction of the complement vitiates any results obtained except with fresh serum; the anticomplementary power, it is stated, can be destroyed by a fresh heating to 55° or 60° C.

"I find myself quite unable to agree to either of these propositions, and I do not remember to have seen any detailed figures on which they are based. My experience is (1) that sera collected aseptically and free from corpuscles are never anticomplementary to an extent sufficient to nullify the Wassermann reaction when carried out as I have described above; and (2) sera kept aseptically either do not alter at all in their anticomplementary power, or, if they do so at all, only to an insignificant extent, and one hardly beyond the range of experimental error."

ABSORPTION OF COMPLEMENT.

"A few words are necessary with regard to the assertion that complement varies in regard to the degree with which it is absorbed by antigen in the presence of syphilitic serum. I have never found this to occur, although I have been carrying out the technic I have described above twice a week at least for the last two and a half years, and must have had experience of at least 250 complementary sera; and I may point out that in the tables of the strengths of sera on different occasions given above it is obvious that it did

not occur, or such constant results could not have been obtained. It is proverbially difficult to prove a negative, and, if a hundred complementary sera were investigated and showed constant results with the same syphilitic serum and antigen, it would be open to anyone to argue that the hundred and first would have shown something entirely different. But if this variability actually occurs, two results follow: (1) it will be impossible ever to constitute an absolute Wassermann unit, and (2) the comparative method which I suggest by the use of standard sera will be additionally useful.

"My complement serum is always used the same day—in fact, as soon as it has separated. Rarely it is used on the second day as well, and I find it gives exactly the same results on the second day as on the first with the same serum and the same antigen, although the strength may have fallen off very decidedly."

METHOD OF TESTING STRENGTH OF A STANDARD SERUM.

This is in brief outline the method of testing the strength of a standard serum so as to get absolute results. An actual example may be of interest.

Complement tested. Unit found to be $10/20 \times 1/50$, or 0.01 c.cm.

Antigen-complement mixture prepared by adding 1 c.cm. of antigen to about 20 c.cm. of saline, then adding $10/20 \times 1/50 \times 5/2 \times 25/8$ c.cm. of complement serum and making up to $22\frac{1}{2}$ c.cm.

This mixture had added to it $2\frac{1}{2}$ units of complement per c.cm. To test the amount actually present, $2/20$, $8/20$, $9/20$, and $10/20$ c.cm. were placed in tubes, made up to 1 c.cm. and $\frac{1}{2}$ c.cm. sensitized emulsion added. The first two tubes showed slight haziness, the last two were clear, indicating that $9/20$ c.cm. contained 1 unit, or 0.9 c.cm. 2 units, the amount required. (I may say that I am not certain that there is not a slight error here, tubes containing antigen not being easy to read off for complete hemolysis; the error, if it occurs, is quite trivial).

First approximation. The serum was tested by the technic already described, and found to give a reaction of 420000. Thus, 0.1 c.cm. of undiluted serum gave a complete reaction under the conditions of the experiment, while the same amount of a 1 in 2 dilution did not.

Second approximation. Dilutions of the serum of 1 in $1\frac{1}{4}$, 1 in $1\frac{1}{2}$, and 1 in $1\frac{3}{4}$ were prepared. The first and second gave no hemolysis, the last a trace of hemolysis.

Third approximation. A dilution of 1 in $1\frac{5}{8}$ was prepared. It gave no hemolysis.

Lastly, the anticomplementary power of the serum was tested and found to be 0.125.

Thus the serum contains 1.625 units of reacting substance. If I were issuing this as a standard serum, I should issue it as giving a complete reaction at 1 in $1\frac{1}{4}$, a partial one at 1 in 2, and no reaction at 1 in 3; and these figures, I believe, would hold whatever technic were used. Such sera should be issued periodically by authority. If any experimenters would like to have them, in order to be able to compare their units with my own, I shall be pleased to send them to them on a small scale as opportunities allow.

CONCLUSIONS.

In this paper, therefore, I have attempted to show:

1. That it is possible to prepare a standard Wassermann unit by the use of antigen prepared in a definite manner. I suggest that until further experience is obtained the absorption of two clear units of complements, tested in the manner described, shall be regarded as a standard unit, this being found to give good clinical results.

2. That antigen prepared in the manner described remains remarkably constant, and that, if several specimens are prepared from different batches of similar ingredients, they will give constant results.

3. That syphilitic sera, prepared aseptically and free from foreign materials, remain constant for at least a month, and probably for much longer, at room temperature.

4. That the use of such sera affords an easy means by which any experimenter can obtain comparable results from time to time.

5. That the use of such sera, accurately standardized, will enable workers by any technic to obtain results which are comparable.

6. I suggest that the Wassermann reaction should be reported in terms of Wassermann units, either those which I have described or some modification thereof, the figures given by each laboratory being the same, whatever the technic, and such as will indicate the number of times the serum is stronger than the weakest serum which will just give definite proof that the patient has syphilis.

The Significance to Medicine of the Creation of a Hebrew University at Jerusalem.

The recent laying of the foundation stone of a Hebrew University at Jerusalem reveals the true spirit of the Jewish people. From the earliest times it has been considered by Jews to be a sin to live in a town in which there was no school, and now the provision, amidst the clash of arms, of means for higher education in the "place in the sun," which the British Government has promised to restore to them, expresses in the most emphatic manner the high value that the Jews continue to attach to intellectual and moral development.

Since antiquity the healing art has specially appealed to the Jew. In Talmudic times, although there was no indigenous school of Jewish medicine, enthusiasm for medical lore was great, partly because such knowledge was daily required for the elucidation of ritual observance. The administration of the dietary laws, for instance, demanded a thorough knowledge of morbid anatomy and pathology to be able to recognize post mortem whether an animal that was killed for food had previously suffered from disease likely to shorten its life, and thus render it *trepha* or unfit for human consumption. The ancient Jewish Court of Justice often employed the services of a medical assessor in matters of medico-legal importance. Although much of the medical knowledge of the Talmudic period was imbibed by the Jews from their Roman and Greek contemporaries, yet there can be no doubt that they contributed a great deal to all the branches of medical science, for their opinions were often opposed to those of the Greek and Roman physicians.

In early post-Talmudic times—i. e., about the fifth or sixth centuries—laws were promulgated forbidding Jews to practice medicine, but in the seventh century the Arabian medical schools contained many Jewish students and teachers. In Egypt and Northern Africa most of the court physicians between the sixth and the fourteenth centuries were Jews.

In modern and recent times the number of Jews who have distinguished themselves in medicine (either as practitioners or as investigators) and cognate sciences all over the world is out of all proportion to their population. The recital of such names as Henle, Remak, Cohnheim, Cohnstein, Zunz, Hermann, Hirsch, Romberg, Weigert, Weichselbaum, Ehrlich, Frankel, Neisser, Wassermann, Senator, Israel, and Baginski is sufficient confirmation of the statement that German medicine is to a large extent Jewish medicine. In the United States the names of Flexner, Jacques Loeb, Rosenau, and Solis-Cohen stand out preeminently; Italy with such men as Lombroso and Otolonghi; and even

Russian medicine has had famous Hebrew names, although until the Revolution Jews were practically debarred from entering the universities.

With such a supply of talent among Jews it should not be difficult to fill the staff of a Hebrew university. Whether the creation of a special Jewish faculty will react beneficially on medical science is difficult to foretell. An eminent Hebrew nationalist writer, when speaking of "the perennial spring of living creative power" among Jews, deplores the scattering of the Jewish genius among the cultures of other nations instead of converging to a focus in a national culture of their own. The creation of a specifically Jewish place of higher study will afford the necessary facilities to those who possess the brains, but lack the "golden key" or some other requirement, for admission into a university. The intensive cultivation produced by concentration of effort under specifically Jewish surroundings will help some of that dormant Jewish talent to germinate which now dies for lack of stimulus. For this reason the medical faculty all over the world will welcome the establishment of a Hebrew university.—*The Lancet*, Aug. 10, 1918.

Inverted Vision.

A study of the rare and little known condition in which the patient sees objects inverted has been made by Bourgeois. Two English cases have been reported, one in a child of 5 in whom the peculiarity was unsuspected until in his earliest attempts at drawing he represented objects inverted. Bourgeois admits that the patient did not possess the power of erecting the retinal image. At this point a remark suggests itself. How did he see his own drawings?

Bourgeois himself reports a case of exceptional facility for reading inverted print, a faculty not acquired by training.

Dr. Doe (of Lyons) has reported a temporary loss of the power of image-erecting, coming on after a cerebral hemorrhage and lasting six hours.

BOOK REVIEWS.

THE PRACTICE OF PEDIATRICS. By Charles Gilmore Kerley, Professor of Diseases of Children in the New York Polyclinic Medical School and Hospital; Attending Physician to the New York Nursery and Child's Hospital; Consulting Physician to the Babies' Hospital; Consulting Physician to the Sevilla Home for Girls and to the New York Home for Destitute and Crippled Children, etc. Second edition, revised and reset. Philadelphia and London: W. B. Saunders Company, 1917, \$6.50.

The present represents the second edition of this well-known work on diseases of children. The book has been subjected to a thorough revision, twenty-five new articles being added and sixteen chapters largely rewritten. The book is written around the wide and varied personal experience of the author, and abounds in case citations. In addition to the present volume the author has also to his credit a work on the treatment of diseases of children, and this enables him to discuss that part of his subject a little more in detail than is ordinarily done in text-books on pediatrics. This feature will appeal to a large proportion of his readers. Perhaps the most valuable portion of the book, however, is the chapter on Gymnastic Therapeutics, in which not only the developmental exercises, but those used in the treatment of poliomyelitis, the ataxias, constipation, flat-foot, etc., are described in detail. This phase of pediatrics is often badly neglected even by the trained pediatrician.

Some of the chapters are quite disappointing, notably those on hydrocephalus, diabetes mellitus, and acidosis in children. Studies in metabolism, in which there have been such great strides along pediatric lines during the last few years, are mentioned only to be condemned, the author on page 194 speaking of physiological chemistry as "a subject of which we can boast but little absolute knowledge." And in the next line he makes the rather amazing statement that "until we possess demonstrable facts, it is best, in teaching, not to go into vague chemical and metabolic theories which no one understands."

A MANUAL OF OTOTOLOGY. By Gorham Bacon, M.D., F.A.C.S., formerly Professor of Otology in the College of Physicians and Surgeons, Columbia University, New York, etc. Assisted by Truman Laurance Saunders, A.B., M.D., Assistant Professor of Laryngology and Otology, College of Physicians and Surgeons, Columbia University, New York, etc. Seventh edition, revised and enlarged. With 204 illustrations and 2 plates. Philadelphia: Lea & Febiger, 1918, \$3.

This little book, which for years has been a favorite with medical students, has by the additions below enumerated been transformed into a brief but valuable text-book for otologists. In addition to the usual chapters on anatomy and physiology, methods of examination, diseases of auricle, external canal, middle ear, etc., there now appear valuable chapters dealing with affections of the internal ear, intracranial complications, and neurotology. In the latter chapter full credit is given to Randall, Jones, and Fisher for their contributions. While the subject of neurotology can be found thoroughly treated in Jones' book, the brief summary in this book stamps it as ultra modern, and furnishes enough to give anyone a very fair idea of the practical application of Barany's notable work.

SURGICAL APPLIED ANATOMY. By Sir Frederick Treves, Bart, G.C.V.O., C.B., LL.D., F.R.C.S., Eng., Serjeant-Surgeon to H.M. the King; Consulting Surgeon to the London Hospital; late Lecturer on Anatomy at the London Hospital. Seventh edition, revised by Arthur Keith, M.D., LL.D., Aber., F.R.C.S., Eng., F.R.S., and W. Colin MacKenzie, M.D., Melb., F.R.C.S. Edin., F.R.S.E. Illustrated with 153 figures, including 74 in color. Philadelphia: Lea & Febiger, \$3.

A work that has reached its seventh large edition, that was originally written by Treves, and whose present revision has been made by so distinguished an anatomist as Arthur Keith, is one whose reputation is assured. The general character of the original is preserved, and in this connection it is interesting to note that Treves had anticipated most of the requirements of war conditions. The nomenclature is duplicate—the old beside the B. N. A.

ANATOMY OF THE HUMAN BODY. By Henry Gray, F.R.S., Fellow of the Royal College of Surgeons; Lecturer on Anatomy at St. George's Hospital Medical School, London. Twentieth edition, thoroughly revised and reedited. By Warren H. Lewis, B.S., M.D., Professor of Physiological Anatomy, Johns Hopkins University, Baltimore, Md. Illustrated with 1,247 engravings. Philadelphia and New York: Lea & Febiger, 1918, cloth, \$7.50; leather \$9.

This edition is yet another improvement on Gray. But our old friend is still recognizable, and those of us who used it more decades ago than we like to remember have only reason to be grateful to the editors. In comparing this Gray with one of twenty-five years ago, one chiefly notes the advantage of having such a text-book edited by a "physiological anatomist." The supreme text-book on anatomy, in the English language, for the student of medicine.

THE MEDICAL RECORD VISITING LIST OR PHYSICIANS' DIARY FOR 1919. Revised. New York: William Wood & Co.; 30 patients, \$1.50; 60 patients, \$1.75; 90 patients, \$2.25.

This undeniably represents the most convenient type of record for the busy practitioner. The fact seems worth stating that in this new edition of the Medical Record Visiting List for 1919 the table of dosage has been changed to conform with the new pharmacopeia, and a table of differential diagnosis of the contagious diseases has been added.

INTERSTATE MEDICAL JOURNAL

VOL. XXV.

JANUARY, 1918

No. 1

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PUBLISHED BY

THE MODERN HOSPITAL PUBLISHING CO., Inc.

Publication Office,
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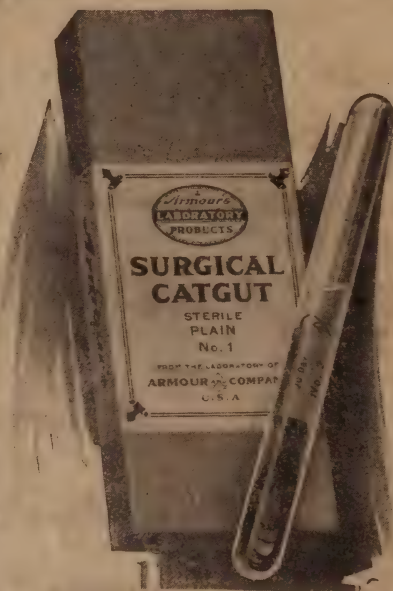
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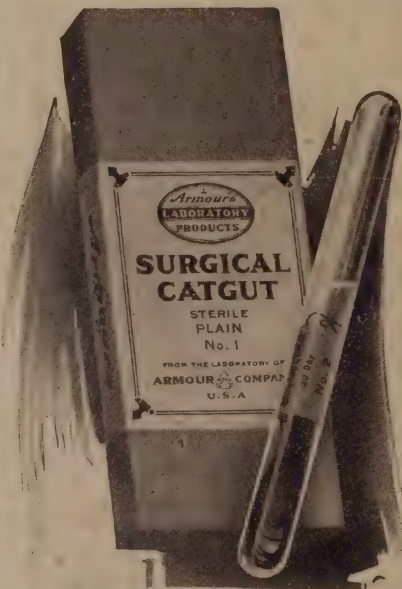
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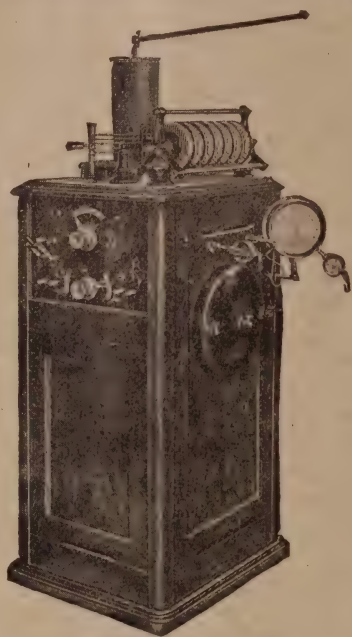
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OCTOBER, 1918

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INTERSTATE MEDICAL JOURNAL

VOL. XXV.

NOVEMBER, 1918

No. 11

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- Recent French Views on Antiseptic Dressings.....*EDITOR*
Functional Methods for Studying Diseased Conditions of Certain Internal
Secretory Organs (the Endocrinopathies).....*JACOB ROSENBLOOM*

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THE MODERN HOSPITAL PUBLISHING CO., Inc.

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